

# THE *PARACYMUS* OF AUSTRALIA (COLEOPTERA, HYDROPHILIDAE)

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The described Australian *Paracymus* were hitherto placed in six species. Of these three are to be considered synonyms of *P. pygmaeus* (MacLeay, 1871): *nitidiusculus* (Broun, 1880), *metallescens* Fauvel, 1883, and *desolatus* Wooldridge, 1976 (new synonymy). To the remaining valid species *P. pygmaeus* (MacLeay, 1871), *spenceri* Blackburn, 1896, and *gigas* Gentili, 1996 another six new species are now added: *P. cariceti*, *wattsi*, *opacus*, *australiae*, *weiri*, and *ovum*. Lectotypes are designated for *P. pygmaeus*, *nitidiusculus*, and *metallescens*. Each valid species is described, discussed, mapped (with a detailed list of localities), figured (aedeagi, outlines) and keyed.

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## INTRODUCTION

This work is intended to continue on with the project of A. F. Newton and M. K. Thayer to improve our knowledge of the Staphyliniformia of Australia. After the studies on the hydrophilid genera *Notohydrus* (Gentili 1992) and *Paranacaena* (Gentili 1993) the genus *Paracymus* Thomson, 1867 is now considered.

Hansen (1991) placed *Paracymus* in the tribe Anacaenini, giving a description of the genus. The features basically characterising *Paracymus* among Anacaenini appear to be the prosternum longitudinally carinate and the presence of a sutural stria on the elytra (see also d'Orchymont 1942).

Gentili (1993) dealt with the nine Australian taxa treated in the literature under the genus *Paracymus*, placing four of them (*lindi* Blackburn, 1888, *sublineatus* Blackburn, 1888, *horni* Blackburn, 1896, and *eremita* Blackburn, 1896) in *Paranacaena* Blackburn, 1888 and one (*nigerrimus* Blackburn, 1891) in *Chaetarthria* Stephens, 1835, leaving in *Paracymus* the remaining four (*pygmaeus* McLeay, 1871, *nitidiusculus* Broun, 1880, *spenceri* Blackburn, 1896, and *desolatus* Wooldridge, 1976). Four other taxa might be added to the list: *Paracymus phalacroides* (Wollaston, 1867); Wooldridge 1978 wrote: 'two females from Australia seem to belong here. If these...specimens are really *P. phalacroides*, they probably are the result of accidental introduction, because they do not seem to be established in...the country'; *Paracymus metallescens* Fauvel, 1883 from New Caledonia;

*Anacaena tepida* Winterbourn, 1970 treated as *Paracymus* in a manuscript of R. Ordish on New Zealand Hydrophilidae, and *Paracymus gigas* Gentili, 1996.

## MATERIAL AND METHODS

More than 6 000 specimens were studied from the Institutes and Museums listed below under 'Acronyms', nearly 5 000 of them belonging to the Australian National Insect Collection. Specimens were examined with a Beck Kassel CBS stereoscopic microscope; the figured aedeagi were mounted in di-methyl-hydantoin-formaldehyde (DMHF) on transparent plastic card, studied and drawn with a GALILEO LG transmitted light microscope equipped with a projection device.

### Acronyms

- AMS – Australian Museum, Sydney.
- ANIC – Australian National Insect Collection, CSIRO, Canberra.
- CASF – California Academy of Sciences, San Francisco.
- FMNH – Field Museum Natural History, Chicago.
- ISNB – Institut Royal des Sciences Naturelles de Belgique, Bruxelles.
- MSNV – Museo Civico di Storia Naturale, Verona.
- NHML – Natural History Museum, London.
- NMW – Naturhistorisches Museum, Wien.
- SAMA – South Australian Museum, Adelaide.
- USNM – United States National Museum, Washington.

## DESCRIPTIONS

Each valid Australian species is discussed below according to the following scheme: (1) References; the dates of description and of the quoted papers conform to Hansen (1999). (2) Type material; I searched for the available types of the described taxa (valid species and synonyms), designating lectotypes and paralectotypes where necessary. (3) Description; many characters are considered: measures, outline, upperside, underside, palps, antennae, legs and aedeagus. (4) Discussion; the species are compared with other similar species or with the proposed synonyms. (5) Material examined; the States of the Australian continent are listed alphabetically; the localities within each State are also listed alphabetically. (6) Biology; the biological notes are derived from the label data.

### 1. *Paracymus pygmaeus* (MacLeay, 1871)

*Cyclonotum pygmaeum* MacLeay, 1871: 133; White in Masters, 1871: 5.

*Coelostoma pygmaeum* (MacLeay): Zaitzev 1908, 404.

*Paracymus pygmaeus* (MacLeay): Blackburn 1888: 820; 1894: 203; Knisch 1924: 167; d'Orchymont 1937: 154, 157; McKeown 1948: 99; Wooldridge 1976: 459–461; Matthews 1982: 55; Hansen 1999: 113.

*Hydrobius nitidiusculus* Broun, 1880: 78.

*Paracymus nitidiusculus* (Broun): Sharp 1884: 467; Blackburn 1888: 820–821.

*Paracymus metallescens* Fauvel, 1883: 352; Knisch 1924: 166; d'Orchymont 1926: 376 (? synonym of *pygmaeus*).

*Paracymus desolatus* Wooldridge, 1976: 458–459; Hansen 1999: 110. New synonymy.

#### Types

*Lectotype* male (1.7 x 1.3 mm): **Queensland**: Gayndah, W. McLeay, 1871, ANIC. A single pin bears the following cards or labels: 1. insect and its abdomen; 2. aedeagus and spiculum gastrale in DMHF; 3. Round amaranth label; 4. Gayndah; 5. *Cyclonotum pygmaeum*, Macl. Gayndah (by hand); 6. On permanent loan from Macleay Museum University of Sydney; 7. Syntype (red label); 8. Lectotype male designated by E. Gentili 1991 (red label); 9. Lectotype male *Cyclonotum pygmaeus* Macl. Det. R. G. Ordish.

*Paralectotypes*: **Queensland**: Gayndah, W. McLeay 1871 (4), ANIC, AMS. The previously mentioned manuscript of R. G. Ordish says: 'For access to syntypes I am indebted to Mr T. A. Weir, CSIRO Canberra and to Dr G. A. Holloway of the Australian Museum, Sydney. I am advised that the material collected from Gayndah was shared between the Macleay Museum and the Australian Museum and that a specimen in the latter has subsequently been labelled as the Holotype, seemingly on the basis of an original name label (McKeown 1948). As the writer points out, 'types in the Macleay Museum collection are not specially indicated as such'. Validity aside, there are two obstacles to this recognition of a holotype. Firstly, all three mounts bear original determination labels in Macleay's hand, and secondly the mount bearing the holotype label (K 19573) has two specimens on it. There are five syntypes from which a subsequent author could choose a lectotype and I have done this by selecting the best preserved male'. The manuscript of Ordish was not published, but his work is so reliable that I follow his statements, designating as lectotype the specimen chosen by him, seen also by me by courtesy of T. A. Weir.

#### Synonyms

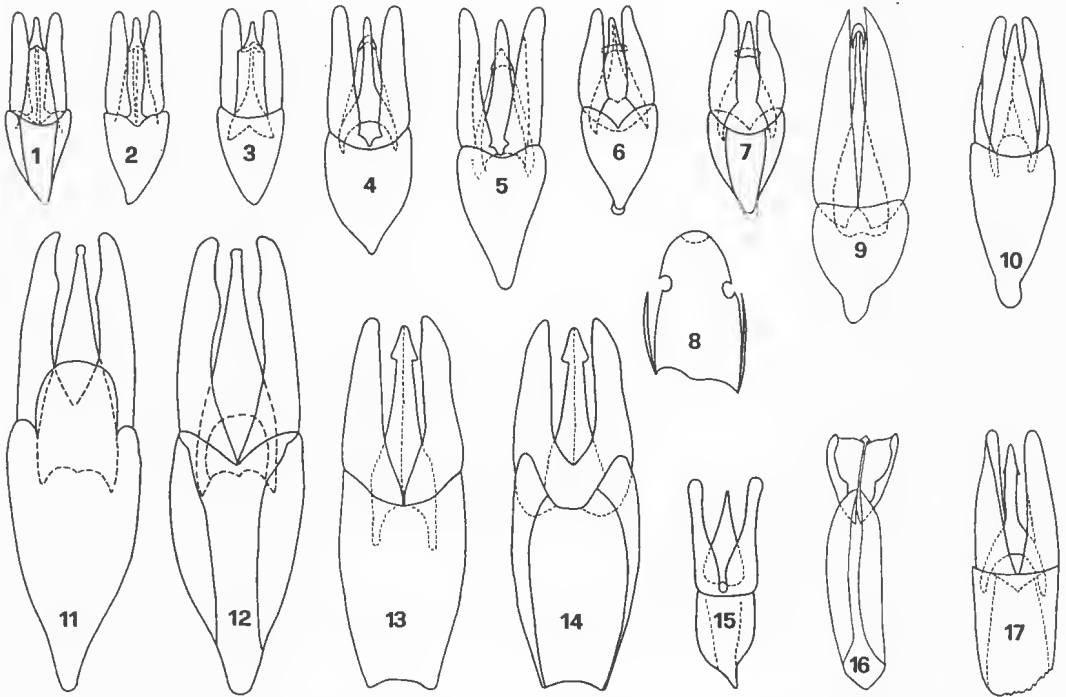
(1) *Hydrobius nitidiusculus* Broun, 1880. *Lectotype* female: **New Zealand**, Tairua, Broun 1880, NHML. A single pin bears the following cards and labels: 1. Insect; 2. 144; 3. Type (Circular label red-bordered); 4. Tairua; 5. New Zealand, Broun Coll., Brit. Mus. 1922-182; 6. *Paracymus nitidiusculus*; 7. female Lectotypus, *Hydrobius nitidiusculus* Broun, E. Gentili 1992 (red label). I did not see other types, but Broun certainly described the species based on more specimens, as in the description he states: 'I obtained the specimens now before me at Tairua and Whangarei Heads'. Blackburn (1888) wrote: 'Appears to be common in South Australia... I have taken it in Western Victoria also'. But in 1894 he wrote: '*Paracymus* (*Cyclonotum*) *pygmaeus*, Macl. I have recently received examples (compared with the type) of this insect from Mr. Lea. They seem certainly identical with *Paracymus* (*Hydrobius*) *nitidiusculus*, Brown. Macleay's is the older name'. After examination of the type, I agree with Blackburn.

(2) *Paracymus metallescens* Fauvel, 1883. *Lectotype* male (2.2 x 1.2 mm): **New Caledonia**, Tonghoué, Savès, ISNB. A single pin bears the following cards and labels: 1. Insect and its abdomen; 2. Aedeagus in DMHF; 3. Coll.

R.I.Sc.N.B., Nouvelle Calédonie, Tonghoué 9me, Rec. Savès, ex Coll. Fauvel (pink card); 4. Coll. et det. A. Fauvel, *Paracymus metallescens* Fvl., R.I.Sc.N.B. 17.479; 5. Syntype; 6. Lectotypus male, *Paracymus metallescens* Fauv., E. Gentili 1991. Three *paralectotypes* are also present in the ISNB, from the following localities: 1) Marais de l'anse Vata, juillet 8me, Nouméa, Rec. Savès; 2) Kanala, Rec. Coste; 3) Koné, Rec. Atkinson. Fauvel (1883) wrote: 'Aussi en Australie'; and d'Orchymont 1926 stated: '*Paracymus metallescens* Fauvel, 1883 from New Caledonia is perhaps the same as *P. pygmaeus* W. S. MacLeay, 1871, from Australia, but no material from the original country could be seen'. Comparison with the Australian insects, including the aedeagus (Fig. 3), leads me to synonymise the two taxa.

(3) *Paracymus desolatus* Wooldridge, 1976.

**Holotype male** (2.1 x 1.2 mm): **Western Australia**, Winjana Gorge, Ross & Cavagnaro 17.10.1962, CASF. A single pin bears the following cards and labels: 1. Insect with semiextracted aedeagus; 2. W. Australia: Winjana Gorge 100 m X.17.62; 3. Collectors E. S. Ross D. Cavagnaro; 4. male; 5. HOLOTYPE *Paracymus desolatus* Wooldridge (red label); 6. California Academy of Sciences Type No. 12007. *Paratypes*: the description quotes 143 males 149 females (including the allotype) from Northern Territory, Queensland, Western Australia, housed in CASF, NHML, SAMA, USNM. I here synonymise *P. desolatus* with *P. pygmaeus* after a long effort to isolate the true characteristics of *desolatus*. These might be: 1) pronotal punctation fine and widely separate, elytral punctation closer and more impressed; in *pygmaeus* pronotal and elytral



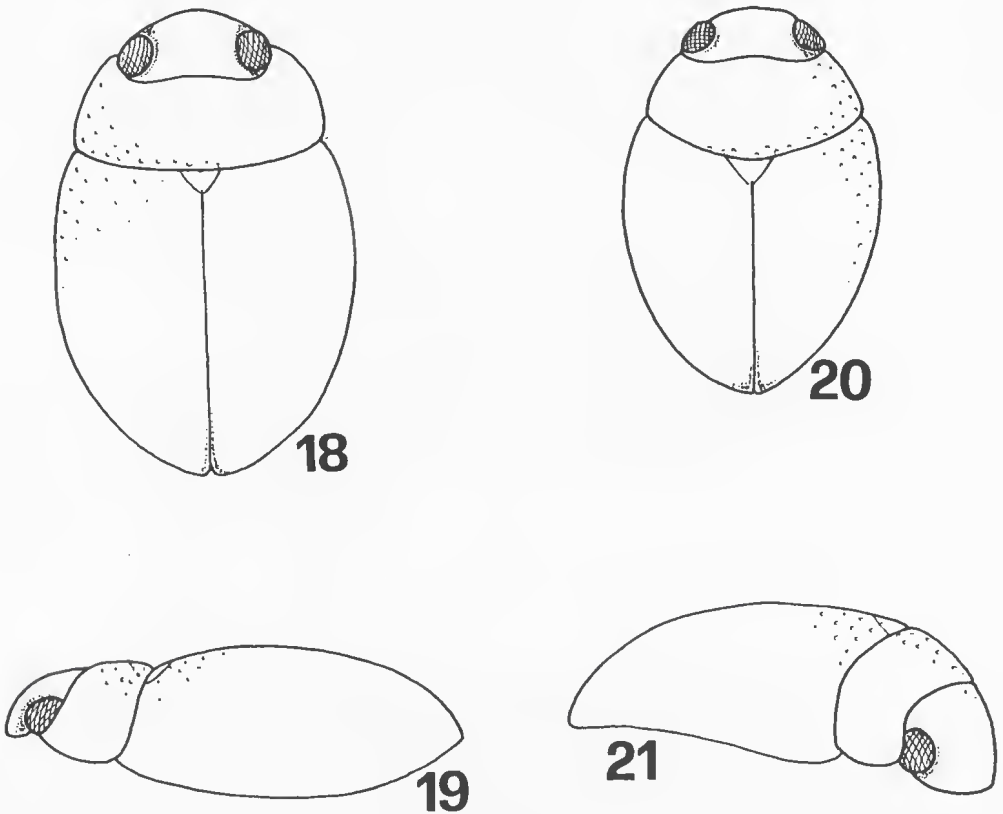
FIGURES 1–17. Aedeagi. 1, *Paracymus pygmaeus* (MacLeay, 1871), lectotype, dorsal view; 2, Idem, ventral view; 3, *Paracymus metallescens* Fauvel, 1883, lectotype, ventral view; 4, *Paracymus pygmaeus* (Kosciusko NP) showing the preapical collar and the connected membrane; 5, *Paracymus pygmaeus* (Warburton): as in Fig. 4; 6, *Paracymus spenceri* Blackburn, 1896, lectotype, ventral view; 7, Idem, dorsal view; 8, Idem, spiculum gastrale; 9, *Paracymus cariceti* n. sp., holotype, ventral view; 10, *Paracymus australiae* n. sp., holotype, ventral view; 11, *Paracymus gigas* Gentili, 1996, holotype, ventral view; 12, Idem, dorsal view; 13, *Paracymus weiri* n. sp., holotype, ventral view; 14, Idem, dorsal view; 15, *Paracymus watsi* n. sp., holotype, ventral view; 16, *Paracymus opacus* n. sp., holotype, dorsal view; 17, *Paracymus ovum* n. sp., holotype, ventral view.

punctuation nearly equal. This character is conspicuous at 100 x but in a great number of sympatric specimens presents a high variability, from insects nearly impunctate to coarsely punctate on the whole dorsal surface; 2) the last segment of male protarsi less widened and hooked than in *pygmaeus*. I examined the holotype but was not able to distinguish the pattern of its protarsi from that of *pygmaeus*; 3) the mesofemora pubescent only on basal triangle, covering only 1/3 of anterior edge; in *pygmaeus* more pubescent, covering nearly 1/2 of anterior edge. In many cases this distinction is in my opinion impossible to see; 4) penis rapidly narrowing and becoming parallel-sided for about one-third its length; narrowly triangular in *pygmaeus*. Really the penis is narrowly triangular, due to a membranous expansion, from the base to a preapical collar in both forms. Sometimes the membranous expansion is scarcely visible or contracted, possibly due to effects of preservation.

(4) *Anacaena tepida* Winterbourn, 1970 is treated as a synonym of *P. pygmaeus* by R. Ordish in the above mentioned manuscript. But no author records it from Australia. Therefore I think it is not necessary to treat this species here.

#### Description

Length 1.6–3.0 mm; width 0.9–1.6 mm. Elongate oval, slightly convex (Figs 18, 19). Head black, evenly punctured, surface shining between punctures, occipital region alutaceous; transverse sutures distinct, coronal suture obsolete. Pronotum dark, a little paler at sides, black to reddish-brown, with olive-green reflections in some specimens; punctuation finer than on head, obvious at sides, faint or absent on disc. Elytra uniform black to reddish-brown, with green reflections in some specimens, shining between punctures, punctures shallow like those of pronotum or shallower, but evenly distributed, with sparse setae laterally; parasutural furrow



FIGURES 18–21. 18, Outline of *Paracymus pygmaeus* (MacLeay, 1871); 19, Profile of *Paracymus pygmaeus*; 20, Outline of *Paracymus watti* n. sp.; 21, Profile of *Paracymus opacus* n. sp.



extended from apex nearly to anterior third of elytra. Under side dark; prosternum broadly keeled in middle and with a projection on anterior border; mesosternum with transverse ridge, a median keel anterior and posterior to it extending to both borders. First visible (third) abdominal ventrite with a median keel throughout its length. Palps pale yellow except for darkened apices; antennae pale yellow, eight-segmented. Profemur ventrally pubescent on proximal third; male protarsus with last segment shorter and broader than in female with two short, ventral, blunt spines; tarsal segments 1–4 (male protarsus) with a single ventral spine; protarsal claws of male less evenly curved than in female but equal in length. Ventral pubescence of mesofemur confined to proximal half or third and not reaching posterior border. Metafemur glabrous with weak longitudinal scratch-like impressions. Aedeagus (Figs 1–5) with tegmen pointed at base, parameres blunt at apex and scarcely longer than tegmen. Penis blunt at apex, with a collar at beginning of the apical third; from collar a membranous expansion reaches base of parameres describing a triangle; sometimes this expansion is scarcely conspicuous, possibly due to the methods of preservation (e.g. ethyl alcohol). Gonopore subapical and ventral.

#### Discussion

This is the most widespread *Paracymus* in Australia. Some of its characters, such as the dorsal punctation and the extension of the hairy surface on the mesofemora, show great variability. It is easy to separate from other species by the shape of its aedeagus: tegmen pointed at base (difference from *weiri* and *ovum*), scarcely shorter than parameres (difference from *opacus*, *gigas*, *weiri*, *australiae*, *cariceti*); penis simply pointed (difference from *cariceti*, *opacus*, *gigas*), with a preapical collar (as in *spenceri*, but the collar of *spenceri* lacks the membranous expansion). Other distinctive characters are the last protarsal segment of males, which is broader than in any other Australian *Paracymus*, and the scarce pubescence of the profemora.

#### Material examined (Fig. 22)

**Australian Capital Territory:** Black Mt., I. F. B. Common 12.11.1964 (1), 16.11.64 (4), 22–26.12.64 (1), 6.1.65 (1), 14.11.65 (1), 14.12.65 (6), 20.12.65 (6), 29.12.65 (9), 6.1.66 (2), 10.1.66 (2), 11.1.66 (2), 18.1.66 (1), 20.1.66 (1), 17.3.66 (2), 21.3.66 (2), 22.3.66 (1), light trap, ANIC; Black Mt., M. S. Upton 15.10.1965 (7), 8.12.65

(1), 15.12.65 (3), 16.12.65 (1), 22.12.66 (3), 24.1.67 (6), 16.10.67 (2), 30.11.67 (1), 12.12.67 (1), 10.1.68 (2), 14.1.68 (1), 17.1.68 (2), 29.1.68 (1), 1.2.68 (2), 2.2.68 (1), 13.2.68 (2), 28.2.68 (1), 4.3.68 (1), 25.3.68 (2), 26.3.68 (5), 27.3.68 (2), 28.3.68 (3), 29.3.68 (3), 12–16.4.68 (1), 22.4.68 (1), light trap, ANIC; Black Mt., Z. Liepa 20.5.1966, ex rotting wood in creek (1); Black Mt., E. B. Britton 25.11.1964 (1) at light, ANIC; Black Mtn Reserve, S. Misko 4.12.1970 (2) light trap, ANIC; Black Mt. 600 m, 35°16'S 149°06'E, Weir Dressler & Lawrence 12.1986 (1) flight intercept window/trough trap, ANIC; Black Mt., Bywater & Clayton 23.1.1967 (1) from nest of Buff-tailed Thornbill, ANIC; Canberra, H. & A. Howden 2–3.XII.1986 (1) black light, ANIC; Cotter River, E. J. Pook 20.12.1965 (5) ANIC; Lake Burley Griffin, Z. Liepa 19.11.1965 (1) ANIC; Narrabundah Orchard, 21.11.1966 (1) ANIC; Paddy's River 1 mi S of Cotter Dam, S. Misko 17.4.1969 (2) ANIC; Piccadilly Circus 1240 m, 35°22'S 148°48'E, Lawrence Weir & Johnson 5.1984, 9.84, 12.84 (6) flight intercept window/trough trap ANIC; Piccadilly Circus, C. Reid 10.12.1984 (1) powerline clearing, ANIC; Piccadilly Circus 6 km NE, Wombat Ck, 35°19'S 148°47'E, 750 m, Weir Lawrence & Johnson 8.1985 (1) flight intercept window/trough trap, ANIC; Snowy Flat Ck, Mt Gingera 0.5 km NE, 35°35'S 148°47'E, A. A. Calder 28.6.1988, ANIC. **New South Wales:** Albury, E. F. Riek 26.1.1963 (2) ANIC; Araluen, Apple Tree Ck, W. & S. Allen 6.12.1975 (1) ANIC; Berry, C. Wats 1.1967 (2) SAMA; Blue Mountains, Foulcon Bridge, 500 m, G. Wewalka 15.1.1993 (8) NMW, MSNV; Blue Mts, H. J. Cox (2) ANIC; Braidwood 15 km NW, Shoalhaven R., C. Reid 19.12.1984 (1) on *Acacia* spp., ANIC; Broken Head Nat. Reserve, Byron Bay 8 km S, Common & Edwards 23.11.1976 (2) ANIC; Canberra Coast Rd, Manar Ck, Britton & Misko 18.5.1967 (2) ANIC; Canberra Coast Rd, Cabbage Tree Ck, 7.7.1965 (1) ANIC; Casino 4 mi W, E. B. Britton at light (1) ANIC; Chichester St. Forest, Allyn R. Park, J. T. Doyen 8.XI.1982 (2), T. Weir 10–11.1981 ANIC; Chiswick nr Armidale, B. Clydesdale 12.1965 (5), 2.66 (2), 6.12.67 (1) ANIC; Clarence R., Brisbane, Coates, Griffith (6) SAMA; Cooma, Duboulay (3) ANIC; Coonabarabran 9 km W, 533 m, 31°17'S 149°11'E, Common & Edwards 2.12.1974 (1) ANIC; Coonabarabran 9 km NNE, Newe 11 Hwy, E. Britton 24.10.1980 Pilliga scrub (2) ANIC; Coonabarabran 14 km W, nr Timor Rock, J. Doyen 4.11.1982 (3) ANIC; Culcairn, E. W. Ferguson (4) ANIC; Darling R., Bourke 20 mi



FIGURE 22. Distribution of the studied specimens of *Paracymus pygmaeus* (MacLeay, 1871).

SSW, on bank, G. F. Gross 26.12.1973 at light (1) SAMA; Delagate 14 km W, C. Watts 4.11.1997 (2) SAMA; Deniliquin, V. R. Squires 10.2.1966 light trap (1) ANIC; Dungong 35 km N, Chichester State Forest, Telegraphy Forest Park, 300 m, Pollock & Reichert 18.12.1990 UV light along river (14) NMW, MSNV; Fowlers Gap Res. Stn, 31°05'S 141°42'E, Cardale & Naumann 29.11–2.12.1981 (18) at light, ANIC; Gilgandra, C. Watts 19.11.1992 (5) SAMA; Griffith, 34°17'S 146°03'E, R. Kohout 10.5.1972 (2) ANIC; Hay 23 mi. E, Britton & Misko 23.10.1967 at light (10) ANIC; Hay 8 km W, 34°30'S 144°51'E, Britton, Misko & Pullen 14.12.1970 (10) river bank, at light, ANIC; Hay 37 km E, E. G. Matthews 10.3.1971 (5) SAMA; Jenolan Caves, vicinity, J. C. Wiburd (4) SAMA; Jindabyne 13 km NE, Kara Ck 940 m, T. A. Weir 16.3.1979 (8) ANIC, MSNV; Jindabyne 12 km NNE, The Lake Ck 1160 m, T. A. Weir 16.3.1979 (11+10 not prepared) ANIC, MSNV; Jindabyne 6 km NW, Thredbo R. 500 m, T. A. Weir 15.3.1969 (1) ANIC; Jindabyne 10 km W, Wollindibby Ck 1060 m, T. A. Weir 15.3.1969 (2) ANIC; Khancoban,

below Khancoban Dam 300 m, 36°13'S 148°06'E, dry sclerophyll forest, Newton & Thayer 13.2.1987 UV blacklight along river (43) FMNH; Kiandra, Alpine Ck, E. Britton 27.1.1966 (2) ANIC; Kosciusko NP, Diggers Ck 1510 m, T. A. Weir 14.3.1969 (2) ANIC; Kosciusko NP, Betts Ck 1740 m, 36°25'S 148°22'E, alpine meadow, Newton & Thayer 14.2.1987 ex *Sphagnum* etc. at stream edge and in bog (2) FMNH; Kosciusko NP, Leather Barrel Ck 980 m, 36°32'S 148°12'E, wet sclerophyll forest, Newton & Thayer 19.12.1986 flood debris ex large log jam, large forest stream (2) FMNH; Kosciusko NP, Sawpit Ck 1200 m, T. A. Weir 14.3.1969 (7) ANIC, MSNV; Kyogle 345 m, Newton & Thayer 2.3.1980 blacklight (1) USNM; Lake Bathurst, C. Reid 17.12.1984, shore mud & on grassland (1) ANIC; Macksville, Wachtel 12.1990 (1f) SAMA; Merindee Lakes Pk, Trust Caravan, G.P.Gross 26.12.1973 at light (6) SAMA; Moonbi Lookout 760 m, 30°58'S 151°06'E, Common & Edwards 11.12.1974 (1) ANIC; Moruya 8 km SE, Congo 35°58'S 150°09'E, M. S. Upton 8 & 14.2.1981 (2) ANIC; Mossgiel 11 km N, Willandra Bridge

- 33°16'S 144°34'E, dry swamp, Britton, Misko & Pullen 21.12.1970 at light (21) ANIC; Mt Kaputar, 2000 ft, C. W. Frazier 4.9.1964, at light (2) ANIC; Mt Keira, 1000 ft, Britton & Misko 7.3.1967 at light (1) ANIC; Mudgee 4 mi SW, 32°36'S 149°35'E, Britton & Misko 18.11.1968 (1) ANIC; Namoi R., Narrabri 30°19'S 149°47'E, J. A. L. Watson 10.3.1969 at light (1) ANIC; Nelson Bay 6 mi ESE, Britton & Misko 21.11.1967 at light (6) ANIC; Queanbeyan 2.7 km NE, 670 m, I. F. B. Common 11.11.1976 (1) ANIC; Sydney 100 m, H. P. Chandler 7.3.1943 (2) FMNH; Tamworth, Lea (2) SAMA; Uralla 6 km N, CSIRO Research Stn 'Chiswick', A. G. Furnival 10.1.1972 (10), 20.11.72 (2), 30.11.73 (4) ANIC; Valery, A. P. M. *Eucalyptus* plantation, Mc Mullens Block, R. McInnes 10.1.1967 (1) light trap, ANIC; Wahroonga, H. J. Carter (4) ANIC; Warrumbungle NP, Siding Spring Mtn, C. Reid 23.XI.1985, *Eucalyptus* forest at light (8) ANIC; Wee Jasper, E. F. Riek 20.4.1961 (4) ANIC; Wentworth Fs, 5.1.1895 (1) SAMA; Wingello 3 km SW, S. Misko 20.2.1974 (4) ex pool, ANIC; Wingham Scrub, 31°52'S 152°22'E, rainforest edge, Britton & Misko 3.1.1970 (3) at light, ANIC; Woy Woy, Pearl Beach, C. Reid 1.12.1984 at light (1) ANIC. **Northern Territory:** Adelaide R., at Daly R. Road Crossing, 13°29'S 131°06'E, E. B. Britton 9.11.1972 (12) ANIC; Adelaide R., 10 km on Daly R. Road, E. F. Riek 25.10.1972 (1) ANIC; Adelaide R., 13°15'S 131°06'E, M.S.Upton 17.10.1972 (14) ANIC, MSNV; Adelaide R. 27 km N, Coomalie Ck, Gross & Forrest 28.9.1977 at light (16) SAMA; Alice Springs 6 mi SE, Emily Gap, Britton, Upton & Mc Innes 17.2.1966 (1) ANIC; Alice Springs 9 km N, Todd R., 23°38'S 133°53'E, M. S. Upton 10.10.1978 (1) ANIC; Alroy Downs HS 15 km SW, 19°24'S 135°58'E, Key & Balderson 10.4.1976 (7) ANIC; Barrow Ck 2 mi S, Britton, Upton & McInnes 13.2.1966 (4) ANIC; Boko Hill 1 km N, SW of Borrooloola, 16°26'S 136°01'E, Key & Balderson 14.4.1976 (2) ANIC; Borrooloola 2 km SSE, McArthur R., 16°05'S 134°19'E, J. E. Feehan 19–20.4.1976 (1) ANIC; Borrooloola 4.5 km W, T. Reardon 8.1982 (1) SAMA; Borrooloola 11 km SW, Goose Lagoon, 16°10'S 136°15'E, J. E. Feehan 17.4.1976 at light (9), M. S. Upton 31.10.1975 (1) ANIC; Borrooloola 12 km NNE, 15°58'S 136°21'E, M. S. Upton 1.11.1975 (3) ANIC; Borrooloola 22 km WSW, 16°08'S 136°06'E, J. E. Feehan 16.4.1976 at light (30), M. S. Upton 2.11.1975 (11) ANIC; Borrooloola 30 km NE, Batten Point, 15°54'S 136°32'E, J. E. Feehan 18.4.1976 at light (9) ANIC; Borrooloola 31 km WSW, Batten Ck, 16°10'S 136°03'E, J. E. Feehan 15.4.1976 at light (7) ANIC; Borrooloola 33 km SW, Caranbirini W.H., 16°16'S 136°05'E, J. E. Feehan 21.4.1976 at light (10), M. S. Upton 3.11.1975 (10) ANIC; Borrooloola 45 km SW, Surprise Ck, 16°25'S 136°05'E, M.S.Upton 5.11.1975 (1) ANIC; Borrooloola 46 km SSW, 16°28'S 136°09'E, J. E. Feehan 23.4.1976 (4), M. S. Upton 28.10.1975 (1) ANIC; Borrooloola 48 km SW, McArthur R., 16°27'S 136°05'E, J. E. Feehan 13.4.1976 at light (4), M. S. Upton 29.10.1975 (1) ANIC; Borrooloola 54 km S, Cattle Ck, 16°32'S 136°10'E, M. S. Upton 27.10.1975 (1) ANIC; Borrooloola 80 km SW, McArthur R., 16°39'S 135°51'E, M. S. Upton 13.5.1973 (10) ANIC, MSNV; Burrell's Ck, Stuart H'way, D. H. Colless 25.11.1972 at light (1) ANIC; Cahills Crossing, E Alligator River, 12°26'S 132°58'E, E. B. Britton 31.10.1972, 3.12.1972 at light (5), E. G. Matthews 29.5.1973 at light (10) ANIC, SAMA; Cahills Crossing 1 km N, E Alligator R., 12°23'S 132°57'E, Upton & Feehan 7.6.1973 (7), E. Britton 31.10.1972 at light (2) ANIC; Cahills Crossing 5 km NNW, E Alligator R., 12°23'S 132°57'E, E. B. Britton 5.11.1972 (1), E. G. Matthews 28.5.1973 (10), Upton & Feehan 8.6.1973 (4), A. H. Watson 8.6.1973 (1) ANIC, SAMA; Cahills Crossing 7 km NW, E Alligator R., 12°23'S 132°56'E, E. B. Britton 4.11.1972 at light (10), E. G. Matthews 27.5.1973 (10) ANIC, SAMA; Cape Crawford 8 km ESE, Bessie Springs, 16°40'S 135°51'E, J. E. Feehan 12.4.1976 at light (13) ANIC; M. S. Upton 26.10.1975 (11), J. E. Feehan 12.4.1976 at light (3) ANIC; Cape Crawford 14 km NW, 16°34'S 135°41'E, M. S. Upton 6.11.1975 (15) ANIC; Cape Crawford 14 km S, Mc Arthur R., 16°47'S 135°45'E, M. S. Upton 25.10.1975 (9), J. E. Feehan 11.4.1976 (16) ANIC; Colyer Lagoon, October Ck, Gross & Forrest 26–27.9.1977 at light (3) SAMA; Curtin Springs HS., Thurmer & Lacis 17.8.1978 (1) SAMA; Daly R., J. C. Lesoeuf 12.7.1971 (5) ANIC; Daly River 10 mi E, B. K. Head 28.6.1972 at light (41) SAMA; Daly R. Mission, J. Hutchinson 6.6.1974, 8.10.1974 at light (2) ANIC; Darwin, F. J. Gay 24.4.1966 (2) ANIC; Darwin, B. Malkin 25.3.1945 (1) FMNH; nr Darwin, Coastal Plains Rsrch Station CSIRO, E. C. B. Langfield 6.6.1966 at light (17), 30.5.1966 at light (8) ANIC, MSNV; Darwin 24 km S, Howard Springs, 12°28'S 131°03'E, E. B. Britton 10.11.1972 rainforest, at light (3), J. A. L. Watson 27.1.1968 at light (1) ANIC; Darwin 30 km SSE, Berry Springs, 12°41'S 130°58'E, E. B. Britton 11.11.1972 at light (2) ANIC; Darwin 50 km S,



- Coomalie Ck, G. F. Gross 28.9.1977 (1) SAMA; Darwin 52 km S, Livingstone Field, Stuart Highway, 12°44'S 132°05'E, E. B. Britton 9.11.1972 at light (16) ANIC; East Point, nr Darwin, 12°28'S 130°50'E, E. B. Britton 12.11.1972 in flowers of *Hybiscus tiliaceus* (1) ANIC; Elliott 15 km SW, L. Woods, Gross & Forrest 5.10.1977 at light (25) SAMA; Groote Eylandt, N. B. Tindale, in moss and lichens (1) SAMA; Jabiru, C. Watts 22.3.1998 (6) SAMA, MSNV; Kakadu NP, Upper S Alligator R., 13°35'S 132°36'E, P. S. Cranston 4–5.6.1988 light trap (8) ANIC; Katherine, L. P. Kelsey 16.8.1973 at light (1), E. G. Matthews 6–10.2.1968 (1) ANIC; Katherine Gorge, M. J. Muller 26.10.1975 light trap (2) ANIC; Katherine 3 km SSW, 14°30'S 132°15'E, T. Weir 12.11.1979 (4) ANIC; Katherine 25 km NE, Katherine R., Gross & Forrest 3–4.10.1977 at light (24) SAMA; Koongarra 12°52'S 132°50'E, M. S. Upton 6–10.3.1973 (4) ANIC; Mataranka 5 km E, Roper R., Gross & Forrest 27.9.1977 at light (8) SAMA; Mataranka 19 km SSE, Elsey Ck, 15°05'S 133°07'E, M. S. Upton 14.5.1973 (9) ANIC; Mt Borradaile 19 km E, Cooper Ck 12°06'S 133°04'E, E. B. Britton 2.11.1972 (4), E. G. Matthews 31.5.1973 at light (25), M. S. Upton 9.11.1972 (1), 5.6.1973 (8) ANIC, SAMA; Mt Cahill 6 km E, 12°52'S 132°46'E, Nourlangie Ck, M. S. Upton 18.11.1972 (2) ANIC; Mt Cahill 8 km N, Nourlangie Ck, 12°48'S 132°42'E, E. B. Britton 26.10.1972 (14), id., D. H. Colless (1), M. S. Upton 19.11.1972 (3), Upton & Feehan 16.6.73 (23), E. G. Matthews 21.5.73 (6) at light ANIC, SAMA, MSNV; Mt Cahill 8 km E, Nourlangie Ck, 12°52'S 132°47'E, E. B. Britton 27.10.1972 (58), id., mud at edge of waterhole (7), E. G. Matthews 22.5.1973 at light (9) ANIC, SAMA, MSNV; Mt Cahill 10 km E, 12°51'S 132°47'E, E. G. Matthews 21.5.1973 (2) ANIC; Mt Cahill 12 km NNW, 12°46'S 132°39'E, E. B. Britton 25.10.1972 at light (1), Matthews & Upton 20.5.1973 (20), Upton & Feehan 15.6.1973 (3) ANIC, SAMA; Mt Cahill 15 km E, Koongarra, 12°52'S 132°50'E, M. S. Upton 15.11.1972 (11), Upton & Feehan 12.6.1973 (9) ANIC; Mt Cahill 15 km E by N, 12°50'N 132°51'E, E. B. Britton 29.10.1972 at light (4), D. Colless 30.10.1972 by sweeping (8) ANIC; Mt Cahill 16 km E by N, 12°50'S 132°51'E, Upton & Feehan 13.6.1973 (14) ANIC, SAMA; Mt Cahill 19 km NE, Baroalba Ck Springs, 12°47'S 132°51'E, E. B. Britton 28.10.1972 (43), M. S. Upton 16.11.1972 (8) ANIC; Mt Cahill 19 km WSW, Jim Jim Ck, 12°57'S 132°33'E, E. B. Britton 24.10.1972 at light (8), Upton & Feehan 17.6.1973 (6) ANIC, SAMA; Mt Cahill 30 km WSW, 12°58'S 132°26'E, E. G. Matthews 19.5.1973 (1) ANIC; Mt Cahill 46 km WSW, S Alligator River, 13°03'S 132°19'E, Matthews & Upton 20.5.1973 (7) SAMA, ANIC; Mudginbarry HS. 2 km N, Magela Ck, 12°35'S 132°52'E, M. S. Upton 14.11.1972 (9) ANIC; Mudginbarry HS. 9 km SSE, Magela Ck, 12°40'S 132°54'E, E. B. Britton 6.11.1972 at light (20) ANIC; Mudginbarry HS. 9 km N, 12°31'S 132°54'E, Upton & Feehan, E. G. Matthews 26.5.1973 (12) ANIC, Upton & Feehan 10.6.1973 (9) ANIC, SAMA, E. B. Britton 30.10.1972 (16) ANIC; Nabarlek Dam, 15 km S of Nimbuwah Rock, 12°20'S 133°19'E, E. G. Matthews 2.6.1973 at light (10) ANIC, SAMA; Nimbuwah Rock 11 km S, Cooper Ck, 12°17'S 133°20'E, E. B. Britton 1.12.1972 at light (12), Feehan & Upton 3.6.1973 (3) ANIC; Oenpelli 6 km SW, 12°22'S 133°01'E, E. G. Matthews 30.5.1973 at light (2), Upton & Feehan 6.6.1973 (5) ANIC, SAMA; Oenpelli 18 km E, 12°17'S 133°13'E, Matthews & Upton 1.6.1973 (6) ANIC; Pine Ck, C. Watts 5.5.1963 (2) SAMA; Port Keats, 14°06'S 129°33'E, M. Mendum 19.8.1968 (1) ANIC; Renner Springs 4.8 km S, N. McFarland 8.3.1966 UV light (11) SAMA; Timber Ck 4 mi W, N. McFarland 14.4.1966 UV light (67) SAMA; Tindal, 14°31'S 132°22'E, W. J. M. Vestjens 1–20.12.1967 light trap (50) ANIC, MSNV; Victoria River Downs 6.4 km SSW, L. P. Kelsey 14–17.7.1973 (4) ANIC; Victoria River Downs 4 mi. WSW, Irrigation Farm, L. P. Kelsey 13.9.1973 (2) ANIC; Victoria River Downs 8 km WSW, L. P. Kelsey 14.8.1973 at light (10) ANIC; Yuendumu, C. Watts 3.1965 (3) SAMA; Wildman River Lagoon, 12°58'S 132°00'E, E. B. Britton 24.10.1972 (6) ANIC; Woolwonga Fauna Res., Dreaming Water, E. F. Riek 20.10.1972 (2) ANIC, MSNV. **Queensland:** Annan Falls 1 km W, 15°31'S 145°14'E, E. B. Britton 26.5.1976 (7) ANIC; Archers Ck, Mt Garnet Rd., J. G. Brooks 28.12.1964 (2) ANIC; Archers Ck 2220', J. G. Brooks 18.4.1974 at light (9) SAMA; Barkley Hwy 7 mi N, on Burketown Rd., J. A. Forrest 23.9.1977 burnt out area, some regrowth, at light (1) SAMA; Boulia 42 km NNW, 22°35'S 139°43'E, M. S. Upton 11.5.1973 (1) ANIC; Bowen, A. Simson (1) SAMA; Brisbane (4) SAMA; Brisbane 50 km S, Canungra, Pollock & Reichert 11.1.1991, black light (105) NMW, MSNV; Cape York Pen., Old Strathgordon, H'stead W of Musgrave, Walford & Huggins 24.11.1983 (9) ANIC; Cardstone, J. G. Brooks 14.11.1966 (3), K. Hyde 17–23.2.1966 (13)



- ANIC; Cardwell Range, J. G. Brooks 30.9.1967 (8) ANIC; Charleville S, M. S. Upton 9.5.1973 (1) ANIC; Cairns Distr., A. M. Lea, at light (6) SAMA; Chillagoe Ck, campsite, Ellis & Hawkins 8.8.1967 (1) ANIC; Cooktown, Airport Rd., roadside swamp, 15°28'S 145°11'E, E. B. Britton 24.5.1976 (9) ANIC; Cooktown 3 km S, Keatings Gap, 15°30'S 145°15'E, Common & Edwards 16.5.1977 (6) ANIC; Cooktown 21 km W, 15°25'S 145°03'E, Common & Edwards 17.5.1977 (5) ANIC; Cooktown 25 mi N, Mc Ivor R., S. R. Curtis 6.5.1970 (37) ANIC; Cooktown 75 km, Cooktown Rd., Boggy Ck, E. B. Britton 26.4.1976 (8) ANIC; Cunnamulla, A. Hardcastle (2) SAMA; Dalby, F. H. Hobler, Griffith Coll. (1) SAMA; Dalrymple 300 m, 30 km N Charters Towers (2) NMW; Eidsvold N, Burnett R., 24°46'S 152°25'E, Holloway & Misko 10.1.1970 at light (2) ANIC; Forty Mile Scrub N. P., Mt Garnet 52 km SW, 18°05'S 144°52'E, Weir & Calder 21.7.1986 (24), 55 km S, 18°06'S 144°50'E, J. Balderson 29–30.11.1981 (1) ANIC; Funnel Ck, 21°47'S 148°55'E, Britton & Misko 12.12.1968 at light (7) ANIC; Gladstone 23 km SE, Calliope R., 23°50'S 151°13'E, S. Misko 23.1.1970 (11) ANIC; Green Hills, J. G. Brooks 19.12.1967 (3) ANIC; Herberton 7 mi SW, 17°27'S 145°27'E, Britton & Misko 6.12.1968 at light (8) ANIC; Hope Vale Mission 7 km N, 15°14'S 145°07'E, T. Weir 4.10.1980 (1) ANIC; Ingham, K. L. Harley 24.2.1960 (2), 30.3.1960 (2) ANIC; Ingham 23 mi SSE, 18°58'S 146°16'E, Britton & Misko 9.12.1968 at light (69) ANIC; Iron Range, 12°42'S 143°18'E, J. G. & J. A. G. Brooks 15.5.1971 at light (1) ANIC; Julatten, Bushy Ck, 16°37'S 145°21'E, E. B. Britton 3.12.1968 from gravel at water's edge (12) ANIC; Kelly, St George R., Cooktown Rd, 16°29'S 144°47'E, E. B. Britton 22.5.1976 (1) ANIC; Kennedy Forest Rd, rainforest 18°13'S 145°47'E, Britton & Misko 8.12.1968 (1) ANIC; Kingaroy 24 mi SW, 26°44'S 151°31'E, Britton & Misko 21.11.1968 (1) ANIC; Kuranda, Barron Falls, J. G. Brooks 12.12.1964 (2) ANIC; Lake Barrine, 18–22.9.1965, E. Britton (2) ANIC; Laura, C. Watts 18.7.1982 (3), 2.8.1974 (1) SAMA; Laura 73 km NW, Hann R., 15°12'S 143°52'E, Weir & Calder 27.6.1986 (25) ANIC; Longreach 31 km NW, Darr R., 23°13'S 144°04'E, M. S. Upton 10.5.1973 (8), 22.10.1975 Darr R. (3) ANIC; L'tle Mulgrave R., J. G. Brooks 16.12.1967 (11) ANIC; MacDonald N.P., Mt Tamborine, J. & E. Doyen 26.11.1982 (1) ANIC; Mackay W, Finch Hatton Ck, 21°08'S 148°38'E, S. Misko 29.11.1968 (5) ANIC; Mackay 50 mi W, Broken River, Misko & Britton 29.11.1968 rainforest, at light (2), S. Misko 30.11.1968 (6) ANIC; Mareeba, K. & E. Carnaby 22.5.1976 (1) ANIC; Mareeba 24 km N, 16°47'S 145°22'E, J. Balderson 24–25.11.1981 (1) ANIC; Mary Ck, 16°33'S 145°12'E, Britton & Misko 4.12.1968 at light (108) ANIC; Mary Ck, 22 km N of Mt Molloy, J. G. Brooks 14.3.1970 at light (20) ANIC; Miriam Vale 21 mi S, 24°38'S 151°34'E, Britton & Misko 14.12.1968 (14) ANIC; Monto 22 km NW, Coomingleh St. For., J. T. Doyen 23.12.1982 (4) ANIC; Mornington Island Mission, Aitken & Tindale 7–11.5.1963 at light (4) SAMA; Mourangee nr Edungalba, 50 mi SW of Rockampton, E. Adams 24.11.1968 at light (3), Britton & Misko 26.11.1968 at light (2) ANIC; Mt Baird 3.5 km SW, 15°10'S 145°07'E, A. Calder 3–5.5.1981 (7) ANIC; Mt Baldy nr Atherton, Forest Res. No. 194, 4000', rainforest, Britton & Misko 5.12.1968 (13) ANIC; Mt Carbine 35 km NNW, J. T. Doyen 13.12.1982 (2) ANIC; Mt Cook N. P., 15°29'S 145°16'E, A. Calder 10–12.5.1981 (1) ANIC; Mt Coolum, 26°35'S 153°05'E, Britton & Misko 15.12.1968 at light (25) ANIC; Mt Inkerman 2 mi SW, 19°45'S 147°30'E, Britton & Misko 11.12.1968 mud, lily ponds (4) ANIC; Mt Lewis, ca. 3000', rainforest, Britton & Misko at light tin working site, 3.12.1968 (2) ANIC; Mt Molloy 17.7 km N, Station Ck 427 m, J. G. Brooks 21.12.1970 (1) ANIC; Mt Tozer 3 km ENE, 12°44'S 143°14'E, Weir & Calder 28.6–4.7.1986 (23), J. C. Cardale (1) ANIC; Mt Tozer 11 km ENE, 12°43'S 143°18'E, Weir & Calder 11–16.7.1986 (5) ANIC; Mt Webb 3 km NE, 15°03'S 145°09'E, A. Calder 30.4–3.5.1981 (3) ANIC; Nettle Ck, J. G. Brooks 20.8.1969 (2) ANIC; Normanton, Tindale & Aitken 4.5.1963 at light (3) SAMA; Paluma 2 km W, Ewan Rd 800 m, 19°06'S 146°34'E, J. G. Brooks 22.2.1972 at light (1) ANIC; Paluma 9 km W, J. G. Brooks 4–13.12.1973 at light (1) ANIC; Pentland, J. C. Lesoeuf 18.7.1975 (1) ANIC; Pistol Gap, Byfield, 22°50'S 150°40'E, Britton, Holloway & Misko 10.1.1970, dry sclerophyll, at light (4) ANIC; Proserpine 8 mi NE, Brandy Ck, 20°20'S 148°41'E, Britton & Misko 11.12.1968 at light (2) ANIC; Ravenshoe 17.7 km W, Archers Ck, J. G. Brooks 13.4.1974 (18) ANIC; Reedy St George R., Cooktown Rd, E. B. Britton 22.5.1976 (1) ANIC; Stanthorpe 9 mi. S, Conardoo, Fletcher 28°46'S 151°51'E, Britton & Misko 20.11.1968 (6) ANIC; Station Ck, J. G. Brooks 14.4.1970 (2) ANIC; Stuart R., Hale & Tindale 1–2.1927 (2) SAMA; Summit 4 km W, Cunninghams Gap N.P., J. Doyen 27–28.11.1982 (1) ANIC; Townsville, B. Malkin 1–2.1945 (2) FMNH; Townsville, P.

- Ferrar 23–30.5.1968 light trap (1) ANIC; Townsville 10 m, G. Wewalka 17.1.1993 (2) NMW; Townsville 5 km N, at Town Common, 19°15'S 146°48'E, S. Misko 19.1.1970 at light (1) ANIC; Wenlock R., Xing Portland Roads Road, 13°06'S 142°56'E, Weir & Calder 17.7.1986 (1) ANIC; Woodstock 7 km S, Lansdown Station, 19°40'S 146°51'E, R. A. Barrett 16.1.1974 (4) ANIC. **South Australia:** Barossa, B. J. Burton (2) SAMA; Devon Downs, S. A. Museum Exped. (1) SAMA; Donovans 6.4 km NW, Ponds Cave, Aitken & Tindale 28.1.1965 (13) SAMA; Eyre Pen., McKeckives Spr., White Flat Rd, Bishop & Diener 14.12.1976 (8) SAMA; Eyre Pen., Strm nr Epsom Sp., White Flat Rd., Bishop & Diener 14.12.1976 (6) SAMA; Eyre Pen., Todd R., White Flat Rd., Bishop & Diener 14.12.1976 (9) SAMA; Eyre Pen., Woolshed Ck, Bishop & Diener 13.12.1976 (2) SAMA; Fairview Cons. Pk, J. A. Forrest 1.4.1982 at light (12) SAMA; Fairview Wildlife Res., 36°49'S 140°24'E, Matthews & Forrest 23.3.1981 at light (2) SAMA; Finness R., R. Malcolm 4.1976 (2) SAMA; Flinders Ranges, Arkaba Ck, E. G. Matthews 5.3.1973 (1) SAMA; Lake Fox edge, P. J. M. Greenslade 18.11.1978, ex litter samples (1) SAMA; Lake George, 37°20'S 140°10'E, Roffey & Mitchell 13.10.1972 (1) ANIC; Monarto Sth, P. McQuillan 19.1.1973 UV light (2) SAMA; Mosquito Ck SE mouth at Haks Lagoon, Thurmer & Gackle 23.4.1979 in water (1) SAMA; Mt Crawford Forrest, C. Watts 10.11.1996 (3) SAMA; Mt Gambier 27 km NE, nr Linwood Pk., swamp in Pine forest, J. A. Forrest 26.3.1982 (4) SAMA; Mt Gambier, Valley Lake, K. F. Walker 1.1.1975 (11) SAMA; Mt Remarkable NP, Mambrey Ck, J. A. Forrest 7.5.1981, E. G. Matthews 17.1.1982 (7) SAMA; Murbko, R. Murray, G. F. Gross 20.2.1973 (2) SAMA; Murray R., R. J. Burton (3) SAMA; Mylor, Scout Jamboree 20.12.1973–6.1.74, el. light (1) SAMA; Nanam's Well 15 km SW, Scorpion Springs C.P., Museum Party 14.12.1983, at light (2) SAMA; New Kalamurina St., Warburton R., Matthews & Houston 9.3.1972 (1) SAMA; Olary 24 km WNW, 32°17'S 140°19'E, Britton, Misko & Pullen 20.12.1970 at light (3) ANIC; Oodnadatta, Blackburn (1) SAMA; Penola Cons. Pk, Penola 14 km W, J. A. Forrest 24.3.1982 (1) SAMA; Penola W nr Calectasia NP, Baker Range Drain, J. A. Forrest 24.3.1982 (12) SAMA, MSNV; Port Lincoln, Blackburn (5) SAMA; Robe 10 km S, C. Watts 1.1983 (2) SAMA; Rudall 2 km S, 33°41'S 136°16'E, Britton, Misko & Pullen 18–19.12.1970 (1) ANIC; Salt Creek 17 mi SE, Gross & Aitken 14.1.1962 at light (3) SAMA; Tintinara 15 mi E, Jimmy's Well, Aitken & Tindale 3.2.1965 (2) SAMA; Yorke Pen., 8 km WSW Carritin Hs., S end of Formby Lisy, N. McFarland 4.11.1965 (1) SAMA. **Tasmania:** Barrow Ck, Mt Barrow 6 km NW, 41°21'S 147°22'E, E. & S. Britton 3.2.1973 (1) ANIC; Forest Reefs, Griffith Coll. (4) SAMA; Frankford, A. M. Lea (2) SAMA; George, C. E. Cole 3.11.1917 (2) SAMA; Hobart, base Mt Wellington, L. Hill 26.1.1979 ex moss & grass (1) ANIC; Kelso (1) SAMA; Kempton Water Tray, L. Hill 28.11.1985 (1) ANIC; Launceston, F. M. Littler (2) SAMA; Orford 4 km W, 42°34'S 147°50'E, J. C. Cardale 27.1.1983 at light (1) ANIC; Tooms R., 460 m, 42°13'S 147°46'E, L. Hill 19.4.1981 (4 ff) ANIC, MSNV. **Victoria:** Alexandra 25 km S, Cathedral Range Nat. Park, Blackwood flat Campground, 445 m, Pollock & Reichert 5.12.1990 black light (1f) NMW; Ballarat, W. W. Froggatt (1) ANIC; Baw Baw Alpine Res., Neulines Mill 1.2 km NW, 1145 m, 37°51'S 146°15'E, wet sclerophyll & *Nothofagus cunninghami*, Newton & Thayer 29.1.1987 berlese leaf and log litter forest floor (1f) FMC; Billabong, Yara Glen, A. Fletcher 20.4.1976 (1) SAMA; Birchip V., J. C. Goudie (1f) ANIC; Dartmoor 5 km NE, C. Watts 11.10.1997 (1) SAMA; Dimboola, Caravan Park, S. Misko 18.11.1973 light trap (5) ANIC; East Pomborneit, 24 km ESE Campdown, temporary pond, P. S. Lake 5.X.1978 (5) ANIC; Healesville, Goudie & Lea 11.? (1), C. Watts 12.1968 (5) SAMA, MSNV; Kawarren 3 km N, Otway Ranges, Gross & Aitken 15.1.1962 at light (14) SAMA; Kerang, R. Blackwood 4.1935 (1) ANIC; Lake Hattah (4) ANIC; Lake Hattah, G. W. Anderson 24–25.10.1967 (2), 28.11.1967 (4), 9–15.3.1969 (2), 9.12.1969 (4) light trap ANIC; Lake Learmonth, E. F. Riek 15.12.1966 (2ff) ANIC; Lerderderg R., 3.8 km WNW Blackwood, A. J. Boulton 27.6 & 25.11.1982 (3) ANIC; Lilydale, A. Fletcher 2.7.1976 (1) SAMA; Lorne, Cressy Ck, N. B. Tindale 21.1.1963 (5) SAMA; Mirrantwa 10 km NE, C. Watts 12.10.1997 (11) SAMA; Mt Buffalo, Blackburn (5) ANIC, SAMA; Mt Buffalo NP, 1310 m, alpine bog, *Sphagnum* moss, Newton & Thayer 18–19.1.1980 (1) FMNH; Noojee 6 km N, C. Watts 8.11.1997 (2) SAMA; Orbost 12 km SW, C. Watts 5.11.1997 (5) SAMA; Otway NP, Binn Rd. 450 m, Cape Horn 58 km N, 38°42'S 143°34'E, wet sclerophyll forest, Newton & Thayer 24.1.1987 (1) FMNH; Ovens R., Wangaratta, Newton & Thayer 9.1.1980 black light (1f) ANIC; Ovens R., Porepunkah, 300 m, 36°42'S 146°55'E, mixed dry sclerophyll and

- exotic trees, Newton & Thayer 12.2.1987 UV blacklight nr River (1f) FMNH; nr Porepunkah, A. Newton 18.1.1980 UV light (1) ANIC; Portland 30 km W, C. Watts 10.10.1997 (2) SAMA; Shepperton 13 km SE, S. Misko 22.11.1973 (2ff) ANIC; Tangil River E, C. Watts 8.11.1997 (8) SAMA; Violet Town 14 km NW, Rd to Shepperton, S. Misko 22.XI.1973 (5) ANIC; Yarra River, Healesville 4.5 km SW, 80 m, 37°41'S 145°29'E, dry sclerophyll forest, Newton & Thayer 6.2.1987 UV black light along river (195) FMNH; Warburton, A. Newton 13–17.1.1980 UV light (1f) ANIC; Warburton 12 km E, 215 m, *Eucalyptus* forest, leaf litter stream edge, Newton & Thayer 12–16.1.1980 (1) FMNH; Wyperfield Nat. Park, Frew's Plain 35°37'S 142°01'E, S. Misko 15–17.XI.1973 at light (14) ANIC, MSNV; Wyperfield Nat. Park, Lowan Treck 35°35'S 142°05'E, S. Misko 16.XI.1973 light trap (21) ANIC, MSNV; Wyperfield Nat. Park, Ranger's House, 35°37'S 142°01'E, Misko & Anderson 17.XI.1973 light trap (4) ANIC; Wyperfield NP, Common-Upton 5.11.1966 (1) ANIC. **Western Australia:** Albany, K. & E. Carnaby 15.12.1976 (5) ANIC; Albany 48 km N, Porongorup NP, J. Kethley 24.12.1976 soil litter and grasses (1) FMNH; Appleton, F. H. Uther Baker, 4.1.1966 (10) ANIC; Armadale 15 mi SSE, Pipehead Dam, M. S. Upton 26.1.1967 (7) ANIC; Armadale, D.E. 7.1961 (1) SAMA; Beverley, A. M. Lea 1870 (5) SAMA; Bunbury, K. & E. Carnaby 31.12.1971 at light (14) ANIC; Bunbury, Whitlock (7) ANIC; Capel, E. Britton 29.10.1965 (6) ANIC; Carson Escarpment, 14°49'S 126°49'E, Common & Upton 9–15.8.1975 (11) ANIC, MSNV; Collie 16 mi N, Common & Upton 7.4.1968 (1) ANIC; Coodanup nr Mandurah, T. E. Bellas 12.1979–1.1980 (1) ANIC; Darling Rgs., A. M. Lea (1) SAMA; Deepdene, Karridale, M. S. Upton 18.1.1967 (10) ANIC; Denmark, Walpole Rd, roadside pool, E. Britton 21.9.1965, 24.9.65 (2) ANIC; Denmark 14 mi E, Parry's Inlet turnoff, 35°01'S 117°09'E, E. Britton 9.11.1969 roadside pond (45) ANIC; Donnybrook, A. M. Lea 1870 (3) SAMA; Drysdale R., 15°02'S 126°55'E, Common & Upton 3–8.8.1975 (10) ANIC; Drysdale R., 14°39'S 126°57'E, Common & Upton 18–21.8.1975 (10) ANIC, MSNV; Dunsborough 20 m, J. B. Kethley 11.1976 at light (1) FMNH; Esperance 20 km E, 33°50'S 122°06'E, J. F. Lawrence 8.11.1977 at light (16) ANIC; Esperance 101 km E, Thomas R., 33°51'S 121°53'E, Britton, Taylor & Upton 20.11.1969 at light, beach dunes (24) ANIC; Fitzroy R., K. & E. Carnaby 16.4.1976 at light (7) ANIC; Fitzroy Crossing, K. & E. Carnaby 18.4.1976 at light (5) ANIC; Fremantle 10 km S, C. Watts 24.10.1996 (1) SAMA; Fremantle, North Lake, H. Demarz 30.1.1954 (2) FMNH; Geraldton 11 km N, N. McFarland 12.11.1972 UV light (3) ANIC; Hyden E, K. & E. Carnaby 5.2.1977 (1) ANIC; Julimar St. Forest, E. Matthews 9.10.1967 (2) ANIC; Kimberley E, Benn R., Helms (6) SAMA; Kimberley E, Upp. Ord R., Helms (1) Griffith Coll., SAMA; Kuliba, Ravensthorpe-Hopetoun, E. Britton 21.9.1965 (1) ANIC; Kununurra nr. Wyndham, Kimberley Research Station, 15°28'S 128°06'E, 27.XI.1956 (31) ANIC, MSNV; Kununurra, E. G. Matthews 13–22.2.1968 (1) ANIC; Kununurra 100 mi E, J. A. Mahon 27.3.1966, light trap (1) ANIC; Margaret R., roadside pond, E. Britton 29.9.1965 (1) ANIC; Mitchell Plateau, 14°40'S 125°44'E, B. V. Timms 23.9.1982 (1) SAMA; Mitchell Plateau, King Ed. R. crossing, Rd., J. B. Kethley 14.10.1976 at light (1) FMNH; Mitchell Plateau, Mining Camp, 14°49'S 125°50'E, Naumann & Cardale 9–19.5.1983 at light (7) ANIC; id., Rentz & Balderson 9–19.5.1983 on light sheet (5) ANIC; id. 3 km NW, 14°48'S 125°49'E, Rentz & Balderson 15.5.1983, airstrip (4) ANIC; id. 4 km S, 14°52'S 125°50'E, Rentz & Balderson 13.5.1983, crusher at light (17) ANIC; id. 10 km NW, 14°45'S 125°47'E, Rentz & Balderson 11–17.5.1983 (2) ANIC; Mowen 10 mi E, Margaret River, 33°57'S 115°34'E, E. Britton 14.11.1969 roadside pond (10) ANIC; Mt Arid 23 km NW, Thomas River 33°51'S 123°00'E, J. F. Lawrence 4–7.11.1977 (14) ANIC; Mt Chudalup St. Pk, North Cliffs 16 km S, J. Kethley 4.12.1976 wet moss on sand over seepage area (1) FMNH; Nannup, Augusta Rd., E. Britton 28.9.1965 (1) ANIC; Osmington 5 mi N, nr Margaret R., 33°57'S 115°04'E, E. B. Britton 15.11.1969 edge of roadside pool (3), under bark of recently felled trees (1) ANIC; Pago Mission 3 mi SE, J. B. Kethley 26.10.1976 at light (3), 27.10.1976 small pool (6) FMNH; Perth, Floreat Park, M. S. Upton 21.1.1967 (1) ANIC; Perth E, Orange Grove Caravan Pk Gosnells, Reid & Gullan 5.1.1986 at light (2) ANIC; Perth S, Yule Brook Univers. Res., C. Reid & P. J. Gullan 7–8.1.1986 at light (23) ANIC; Perth 30 km N, C. Watts 14.10.1996 (3) SAMA; Picton Junction, swamp nr Ferguson R., Britton & Uther Baker 30.11.1965 (16) ANIC; Pinjarra, Lea 1870 (10) SAMA; Pinjarra 8 mi E, South Dandalup R., 32°35'S 115°53'E, E. Britton 17.11.1969 clear brook flowing over stones (42) ANIC, MSNV; Pinjarra 6 km S, C. Watts 6.10.1996 (9) SAMA; Walpole Rd, Nornalup



Beach Rd, S. & J. Peck 20–26.6.1980, flight intercept traps (2) ANIC; Walsh Pt 5 km W, 14°34'S 125°48'E, Rentz & Balderson 10.5.1983 (2) ANIC; Wilga, K. & E. Carnaby 11.1973, 8.12.74 etc. (33) ANIC; William Bay, stream on road to, E. Britton 24.9.1965 (3) ANIC; Wyndham, K. & E. Carnaby 20.4.1976 at light (1) ANIC; Yanchep NP, Yanchep 9 mi N, Common & Upton 12.4.1968 (1) ANIC.

### Biology

From label data I extracted the following indications about the habits of *P. pygmaeus*. Most specimens are collected in flight: at light, light trap, on light sheet, UV light, black light, flight intercept traps, window-trough traps. Another method is collecting along edges, shores or banks of brooks, creeks, rivers, pools, bogs, swamps, waterholes, ponds and lakes: in mud, sand, gravel, aquatic plants such as lilies, *Sphagnum*, moss, and lichens; more rarely in open water. Also, litter is a source of specimens: wet rotting wood, bark of fallen trees, leaves on forest floor, soil and grasses, floating debris. Exceptional captures are: from nest of buff-tailed thornbill; in flowers of *Hybiscus tiliaceus*; on *Acacia* spp.

### 2. *Paracymus spenceri* Blackburn, 1896

*Paracymus spenceri* Blackburn 1896: 256–257; d'Orchymont 1942: 59–60; Wooldridge 1976: 454–455; Hansen 1999: 114.

*Paranacaena spenceri* (Blackburn): Knisch 1924: 168.

### Types

**Lectotype male: Northern Territory:** Paisley Bluff, Reedy Creek, Blackburn Coll. NHML. A single pin bears the following cards and labels: 1. Insect (and) I, 5480, Reedy Cr., male; 2. Aedeagus (on transparent card); 3. Type (round label with red border); 4. Australia, Blackburn Coll., B.M. 1910–236; 5. *Paracymus spenceri* Blackb.; 6. *Paranacaena spenceri* Blackb., LECTOTYPUS male, E. Gentili 1991, Aedeagus in DMHF soluble in distilled water. **Paralectotype: Northern Territory:** Paisley Bluff, Reedy Creek SAMA. A single pin bears: 1. Insect (dorsally glued, and) 5480, Reedy Creek; 2. *Paracymus spenceri* Blackb., co-type; 3. *Paracymus spenceri* Blackb., Paralectotypus, E. Gentili 1992 (red label); 4. S. A. Museum specimen (red label). The Blackburn description records four typical specimens from Paisley Bluff, Reedy Creek; I did not see other types.

### Description

Length 1.5–2.3 mm; width 0.8–1.3 mm. Elongate oval, slightly convex (Figs 18, 19). Head black, sometimes with violet reflection, evenly punctured, surface shining between punctures, occipital region alutaceous; only lateral branches of Y-suture scarcely conspicuous. Pronotum dark as head, becoming yellow to mahogany at sides; punctation thicker than on head, surface shining between punctures. Elytra mahogany or red-brown, lighter near apical region; punctation as on pronotum but less evident, without serial arrangement; some specimens nevertheless have traces of serial punctures due to partial transparency of elytra; parasutural furrow in apical 2/3 of elytra or a bit less. Underside dark; prosternum with longitudinal keel; mesosternum carinate with an arrow-like keel; first visible abdominal ventrite laterally shorter than second, centrally with thin longitudinal keel. Maxillary palpi yellow, tips darker; antennae eight-segmented, yellow with darker club. Profemora ventrally pubescent on basal 3/4 (or 2/3), male protarsi with a blunt spine under last segment; mesofemora pubescent near base; metafemora without hydrofuge hairs. Aedeagus as in Figs 6–8, tegmen nearly as long as parameres, with a cardioid form; parameres progressively narrowing but slightly expanded laterally at their tip; penis roughly triangular, provided with a subapical collar.

### Discussion

Easy to distinguish among Australian *Paracymus* by the contrasting colour of the pronotum/elytra. The male protarsus is thinner, and the profemoral pubescence thicker than in *pygmaeus*. The shape of the aedeagus is near to that of *pygmaeus*, but the outline of the tegmen and parameres is more curved, and the preapical collar lacks any membranous expansion.

### Material examined (Fig. 23)

**Australian Capital Territory:** Black Mountain, I. F. B. Common 25–26.12.1964 light trap (1), 6.1.1966 light trap (1), M. S. Upton 22.12.1966 light trap (1) ANIC. **New South Wales:** Dorrigo NP, E end, Blackbutt Track 710 m, subtropical rainforest, Newton & Thayer 28.2–5.3.1980 in and under rotting fruits of *Endiandra introsa* (1) USNM; Nightcap NP, Mt Nardi, Newton Drive 700 m, warm-temperate rainforest, 28°33'S 153°17'E, Newton & Thayer 4.1.1987 Berlese leaf and log litter, forest floor (5) FMNH; Uki 18 km W, Mebbin St. For., J.



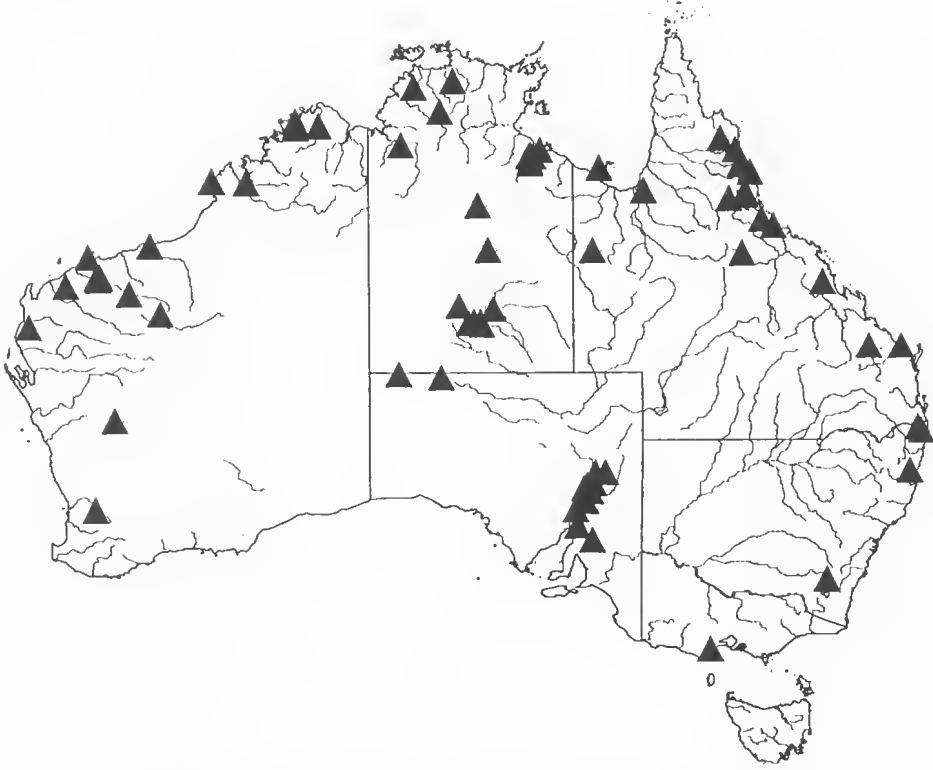


FIGURE 23. Distribution of the studied specimens of *Paracymus spenceri* Blackburn, 1896.

Doyen 23–24.11.1982 (1) ANIC. **Northern Territory:** Alice Springs 80 mi NW, C. Watts 2.1968 (5) SAMA; Alice Springs 5 mi N, Wigley Waterhole, Britton Upton & McInnes 16.2.1966 (2) ANIC; Alice Springs 6 mi SE, Emily Gap, Britton Upton & McInnes 17.2.1966 (2) ANIC; Alice Springs 9 km N, Todd R., 23°38'S 133°53'E, M. S. Upton 10.10.1978 (3) ANIC; Alice Springs 33 km WNW, 23°36'S 133°34'E, M. S. Upton 30.9.1978 (3) ANIC, MSNV; Alice Springs 99 km NE, Ongeva Ck, 23°01'S 134°29'E, M. S. Upton 13.10.1978 (1) ANIC; Batchelor 1 km SE, N. McFarland 12.4.1966 UV light (3) SAMA; Borroloola 11 km SW, Goose Lagoon, 16°10'S 136°15'E, J. E. Feehan 17.4.1976 at light (4) ANIC, MSNV; Borroloola 22 km WSW, 16°08'S 136°06'E, J. E. Feehan 16.4.1986 at light (1) ANIC; Borroloola 30 km NE, Batten Point, 15°54'S 136°32'E, J. E. Feehan 18.4.1976 (1) ANIC; Borroloola 31 km WSW, Batten Ck, 16°10'S 136°03'E, J. E. Feehan 15.4.1976 at light (1) ANIC; Borroloola 45 km SW, Surprise Ck, 16°25'S 136°05'E, J. E. Feehan 14.4.1976 at light (1) ANIC; Borroloola 48 km

SW, McArthur R., 16°27'S 136°05'E, J. E. Feehan 13.4.1976 at light (1) ANIC; Edith Falls, J. C. Lesoeuf 8.7.1971 (1) ANIC; Mt Cahill 8 km N, Nourlangie Ck, 12°48'S 132°42'E, Upton & Feehan 16.6.1973 (1) ANIC; Renner Springs 4.6 km S, N. McFarland 8.3.1966 UV light (1) SAMA; Timber Ck 4 mi W, N. McFarland 14.4.1966 (2) SAMA; Wauchope 30 km N, 20°22'S 134°14'E, M. S. Upton 13.10.1972 (5) ANIC, MSNV. **Queensland:** Archer R., C. Watts 28.10.1984 (1) SAMA; Barkley Hwy 7 mi N, on Burketown Rd, J. A. Forrest 23.9.1977 burnt out area some regrowth, at light (1) SAMA; Cairns, Edge Hill, J. G. Brooks 11.11.1967 (1) ANIC; Cardstone, K. Hyde 9–13.3.1966 (3) ANIC; Cooktown Rd 75 km, Boggy Ck, E. B. Britton 26.4.1976 (3) ANIC; Eidsvold N, Burnett R., 24°46'S 152°25'E, Britton, Holloway & Misko 10.1.1970 at light (2) ANIC; Forty Mile Scrub Nat. Pk, Mt Garnet 52 km SW, 18°05'S 144°52'E, Weir & Calder 21.7.1986 (2) ANIC; Funnel Ck 21°47'S 148°55'E, Britton & Misko 12.12.1968 at light (4) ANIC, MSNV; Ingham 23 mi SSE, Crystal Ck, 18°58'S 146°16'E,

- Britton & Misko 9.12.1968 at light (2); Laura, C. Watts 18.7.1982 (2) SAMA; Monto 22 km NW, Coomingleh St. For., J. T. Doyen 23.12.1982 (1) ANIC; Mornington Island Mission, Aitken & Tindale 11.5.1963 at light (1) SAMA; Normanton, Tindale & Aitken 4.5.1963 at light (1) SAMA; Pentland, J. C. Lesoeuf 12.7.1975 (1) ANIC; Station Ck, J. G. Brooks 19.4.1970 (3) ANIC; Townsville, P. Ferrar 19.11.1967 light trap (1) ANIC; Tully 40 km W, E. F. Riek 31.5.1971 (3) ANIC, MSNV. **South Australia:** Chambers Gorge, C. Watts 9.1983 (5) SAMA; Enorama Ck, Amena Valley Rd, Nth. Flinders, Suter Mitchell & Marchant 26.7.1976 (1) SAMA; Flinders Ra., Arkaba Ck, E. G. Matthews 5.3.1973 (10) SAMA, MSNV; Flinders Ra., Blinman 12 km NW, I & II springs, J. A. Forrest 10.5.1981 (2) SAMA; Flinders Ra., Brachina Ck nr. Heysen Hill, J. A. Forrest 9.5.1981 (1) SAMA; Flinders Ra., Eringunda V., E. G. Matthews 6.3.1973 (2) SAMA; Flinders Ra., Parachilna Gorge, C. Watts 10.1981 (1) ANIC; Flinders Ra., Wooltana HS 6 km SW, Munyallina Ck, J. A. Forrest 12.5.1981 (1) SAMA; Manu Ra., Angatja homestead 5 km N, damp litter, L. E. Watrous 11.5.1983 (3) FMNH; Mt Remarkable, L. E. Watrous 29.4.1983 black light (1) FMNH; Musgrave Ra., Ernabella 13 km N, L. E. Watrous 7.5.1983 (12) FMNH; Musgrave Ra., Rock Hole, SSE Mt Woodruffe, L. E. Watrous 8.5.1983 black light (7) FMNH; Owieandana, N Flinders Ra., Hale & Tindale (2) SAMA; Parachilna, Flinders Ra., Griffith Coll., (1) SAMA; Quorn 30 km NNW, Buckaringa Gorge, C. Reid 18.12.1985 (2) ANIC; Woodendina Ck, Nirrana, Flinders, Bishop & Diener 16.12.1976 (4) SAMA, MSNV. **Victoria:** Turtons Track, Otway Ranges, Gross & Aitken 17.1.1962 (1) SAMA. **Western Australia:** Beverley, Griffith Coll. (7) SAMA, MSNV; Cane River HS. 17 km N, 21°56'S 115°39'E, Upton & Mitchell 27.4.1971 (5) ANIC, MSNV; Carson Escarpment, 14°49'S 126°49'E, Common & Upton 9–15.8.1975 (7) ANIC, MSNV; Dampier, Dampier Is., Intercourse, pool standing water, J. B. Kethley 2.10.1976 (2) FMNH; Derby, W. D. Dodd (1) SAMA; Kimberley Bore, K. & E. Carnaby 13.3.1980 at light (1) ANIC; Kimberley W, Cape Bertholet 8 km S, 17°19'S 122°10'E, D. H. Colless 19.4.1977 (1) ANIC; Millstream, 21°35'S 117°04'E, E. B. Britton 28.10.1970 at light, open eucalypt paperbark woodland (2) ANIC; 28.10.1970 at light, open eucalypt-paperbark woodland kangaroo grazed grass (1) ANIC; 28.10.1970 Crystal Pool (4) ANIC; 29.10.1970 shallow stream (18) ANIC; 29.10.1970 at light spinifex-eucalypt junction (22) ANIC; 30.10.1970 eucalypt-spinifex (2) ANIC; 31.10.1970 (10) ANIC; 1.11.1970 gravel at margin of Crossing Pool (24) ANIC; 2.11.1970 from gravel at edge of pool at pipe crossing (82) ANIC, MSNV; 1.11.1970 at light, eucalypt-paperbark woodland (1) ANIC; 2.11.1970 palm-eucalypt-melaleuca assoc. at light (6) ANIC; 3.11.1970 shallow weed-grown pool (2) ANIC; 3.11.1970 at light (28) ANIC; 4.11.1970 Crossing Pool, at light (1) ANIC; 5.11.1970 waterside gravel in pipe, Crossing Pool (16) ANIC; 5.11.1970 eucalypt-spinifex, at light (2) ANIC; 5.11.1970 Crystal Pool, at light (14) ANIC; 7.11.1970 mouth of Dawson's Ck (17) ANIC; 8.11.1970 Deep Reach, at light (3) ANIC; Millstream, Crossing Pool, D. H. Colless 21.10.1970 (2) ANIC; Millstream HS, E. F. Riek 4.4.1971 (5) ANIC; Millstream HS. ½ km WNW, 21°35'S 117°04'E, M. S. Upton 21.10.1970 (4), Upton & Mitchell 14.4.1971 (24) ANIC, MSNV; Millstream 1 km NE, 21°35'S 117°04'E, M. S. Upton 24.10.1970 (14) ANIC; Millstream 1 km NNE, M. S. Upton 3–4.4.1971 (14) ANIC; Millstream 1 km N, M. S. Upton 9–10.4.1971 (3) ANIC; Millstream 2 km ENE, M. S. Upton 21.10.1970 (1) ANIC; Millstream HS. 3 km NW, 21°34'S 117°03'E, Upton & Mitchell 22.4.1971 (7) ANIC; Millstream HS. 5 km SE, 21°37'S 117°06'E, Upton & Mitchell 17.4.1971 (1) ANIC; Millstream 8 mi ENE, D. H. Colless 20.10.1970 (5) ANIC; Millstream 15 km E, 21°35'S 117°12'E, M. S. Upton 20.10.1970 (8) ANIC; Minilya R., 23°49'S 114°00'E, Upton & Mitchell 29.3.1971 (14) ANIC, MSNV; Mitchell Plateau, Mining Camp, 14°49'S 125°50'E, Rentz & Balderson 9–19.5.1983 (1) ANIC; id., 4 km S, 14°52'S 125°50'E, Rentz & Balderson 13.5.1983 (1) ANIC; Mt Magnet, K. & E. Carnaby 28–29.9.1978 (1) ANIC; Newman 13 km E, 23°15'S 119°52'E, E. B. Britton 12.11.1970 (8) ANIC; Walsh Pt 8 km SW, Escarpment, 14°37'S 125°48'E, Rentz & Balderson 10–17.5.1983 (1) ANIC; Wittenoorn 13 km ESE, 22°18'S 118°27'E, E. B. Britton 11.11.1970 (1) ANIC.

### Biology

The label data are scarcer than for *pygmaeus*, but similar. The species is collected most frequently at light (also UV light, black light), then at edge of standing or flowing water, e.g. in gravel, and occasionally in damp leaf and log litter on the forest floor. An exceptional capture is in and under rotting fruits of *Endiandra introsa*.

### 3. *Paracymus gigas* Gentili, 1996

*Paracymus gigas* Gentili 1996: 178; Hansen 1999: 111.

#### Types (Fig. 24)

*Holotype* male: **Western Australia**: Mitchell Plateau, Amax Warrender Rd 3 mi W, J. B. Kethley 21.10.1976, spring pool drainage, FMNH.

#### Description

Length 3.0 mm, width 1.8 mm. Convex, widely oval, black. Head 1.5 x as wide as long, black, densely punctured, interspaces once to twice width of punctures; anterior margin of labrum uniformly curved; eye/interocular space ratio nearly 0.7. Pronotum black with testaceous lateral margins, sides strongly curved; densely punctured as head, between punctures slightly shagreened. Scutellum black, trapezoidal, elongate, slightly protruding anteriorly. Elytra black, pale near lateral borders, with normally developed parasutural furrows, punctures somewhat denser

than on pronotum and head, shagreened between punctures. Postlabium rectangular, flat and smooth; antennae 9-jointed; maxillary palpi long 0.6 x width of head; eyes large below. Prosternum with longitudinal keel; mesosternum with arrow-head-like keel; metasternum raised in middle, with conspicuous triangular dimple in raised area; abdominal ventrites pubescent. Profemora ventrally pubescent, mesofemora so only on and near trochanters, metafemora glabrous. Aedeagus as in Figs 11, 12: tegmen pointed at base, longer than parameres, ventrally protruding and covering base of penis with a jut; parameres blunt at apex and interiorly scythed; penis progressively constricted from base to apex, this slightly expanded as a button.

#### Discussion

Larger than all described Australian *Paracymus*, this species is immediately identified by its long maxillary palps, the 9-segmented antennae, and the metasternal dimple. The length of the palps and the shape of the aedeagus (e.g. tegmen with a

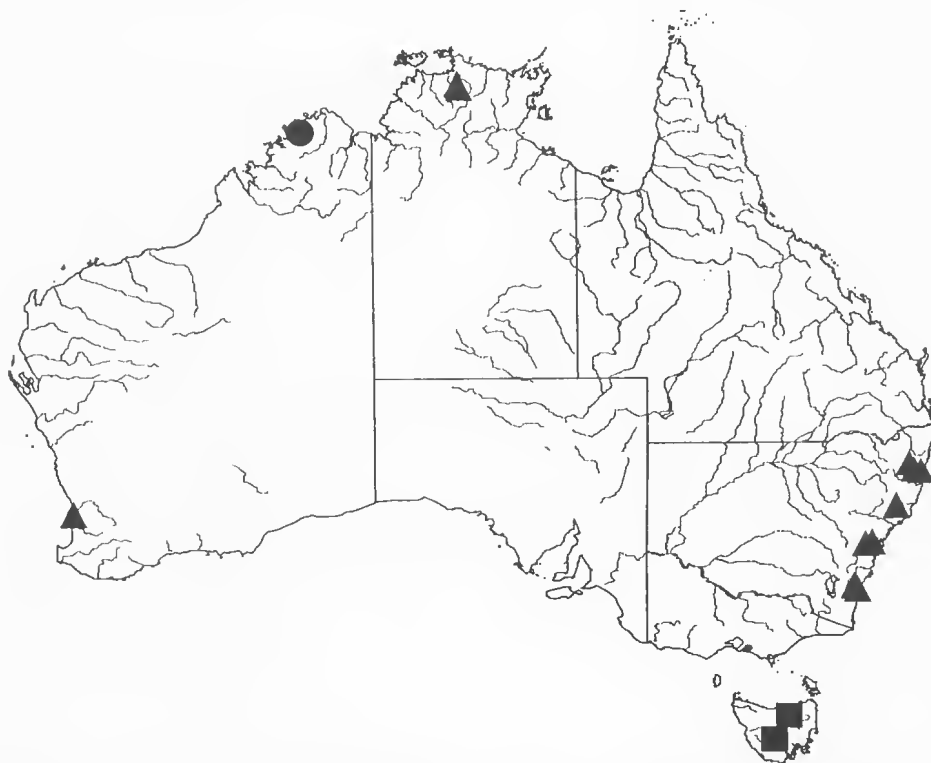


FIGURE 24. Distribution of the studied specimens of *Paracymus wattsi* n. sp. (▲), *cariceti* n. sp. (■), *gigas* Gentili, 1996 (●).

ventral jut covering the base of the penis) might suggest that it belongs to the genus *Notohydrus*; but the longitudinally keeled prosternum suggests the genus *Paracymus*.

#### 4. *Paracymus cariceti* n. sp.

*Types* (Fig. 24)

*Holotype* male (1.7 x 1.1 mm): **Tasmania:** 42°32'S 146°30'E, Map 8212.593.923, Adj. Misery Creek 780 m, 21.2.1980, L. Hill coll., short sedge and rush turfs, ANIC, CSIRO. *Paratype:* **Tasmania:** male (without aedeagus, previously lost): Tasmania, Launceston, SAMA. Another specimen in SAMA, a female, labelled 'Launceston, Tas., Jan., C. Watts', might belong to this species, but apart from the slightly greater size it has the first abdominal segment with a longitudinal keel, lacking in the two typical males.

#### *Description*

Length 1.7–1.8 mm; width 1.0–1.1 mm. Widely oval, slightly convex. Dorsally black, head with metallic reflections, pronotal borders and elytral apex darkly testaceous. Labrum centrally hollow; anterior margin of clypeus straight; head, under 100 x magnification, slightly shagreened, with scarcely visible punctures; interocular space 3.6 x eye width. Pronotum smooth, with sparse punctures clearly visible at 100 x magnification, space between them nearly as large as punctures. Scutellum triangular, equilateral, smooth, with scarce and fine punctures. Elytra smooth, with a more or less faint shagreen at 100 x, with sparse punctures as on pronotum; parasutural furrow in apical 2/3 or a bit less. Underside testaceous, head black. Postlabium nearly rectangular, flat, smooth and shining; gula smooth. Prosternum carinate with a high longitudinal keel; mesosternum anteriorly provided with transverse tooth, and posteriorly with longitudinal keel; metasternum concealed under recumbent hairs. Five visible abdominal ventrites, glabrous and smooth, the first being the shorter, the last the longer; first ventrite without a longitudinal keel but with scarcely visible tubercle along central line; if specimen from Launceston previously recorded belongs to this species, female has a keel on first ventrite. Palps short and stout; profemora pubescent along anterior margin; mesofemora pubescent to knees; metafemora with scarce hairs near trochanters. Aedeagal length (Fig. 9) between 1/3 and 1/4 of body; tegmen narrow at its base, much shorter than parameres; these acute and

longer than penis; penis basally swelling, then rod-like, anchor-shaped at tip, without any collar.

#### *Discussion*

This Tasmanian species differs from other Australian *Paracymus* chiefly by its aedeagus, which has the tip of the penis anchor-shaped at the apex, and the apex of the parameres acute. Other unique characters are the mesofemur which is completely pubescent on its ventral face, and the first ventrite having a tubercle instead of a longitudinal keel. Size and colour are similar to small *P. pygmaeus*; but it differs from this species in the aedeagus, which has a shorter tegmen, and the features mentioned; in its shorter and wider body shape; in its shorter and stouter palps; and in having the first abdominal segment not keeled.

#### *Biology*

The name *cariceti* comes from a label note: short sedge and rush turfs.

#### 5. *Paracymus ovum* n. sp.

*Types* (Fig. 25)

*Holotype* male (2.8 x 1.45 mm): Kalbarri Nat. Pk, Northampton 54 mi N, Common & Upton 19.4.1968, ANIC; *paratypes* (3): same data as the holotype, ANIC, SAMA, MSNV.

#### *Description*

Length 2.5–2.8 mm; width 1.35–1.45 mm; elongate oval, slightly convex (Figs 18, 19). Head black, irregularly punctured, interspaces alutaceous or smooth, as large or larger than punctures, these less strong and deep than in *weiri*; labrum nearly concealed under head; eyes together as wide as nearly 4/7 of interocular space; Y-suture conspicuous only as periocular groove. Pronotum black with thin testaceous lateral border; punctures irregularly distributed as on head, a little more faint, interspaces alutaceous (chiefly on borders) or smooth (chiefly on disc); anterior corners clearly produced. Scutellum triangular, longer than wide. Elytra black with thin testaceous border; punctured as on pronotum, partly alutaceous; parasutural furrow in apical 2/3 or a bit less. Underside dark; postlabium smooth with small punctures; prosternum roof-like, keeled; mesosternal keel anteriorly like an arrow-head; metasternum posteriorly with glabrous area surrounded by tufts of hairs; first abdominal ventrite centrally covered with flat longitudinal keel, enlarging anteriorly. Palps yellow, second



joint enlarged, last joint more slender than in *weiri*; antennae 8-segmented, yellow with a dark club. Profemora widely hairy, mesofemora only on basal third, metafemora glabrous. Aedeagus (Fig. 17) concave at base, tegmen nearly as long as parameres, these blunt at apex; penis rod-like with small subapical expansion or collar.

#### Discussion

Only the shape of the aedeagus differentiates *ovum* from all other Australian *Paracymus*; other differences are combinations of characters. It is similar to *weiri*, but differs in having a more slender, nearly parallel-sided body (Figs 18, 19); an upperside partly alutaceous; a flat keel on the entire first ventrite; a different aedeagus: tegmen shorter (in *weiri* it is longer than parameres, in *ovum* subequal), and penis less stout.

#### 6. *Paracymus watti* n. sp.

*Paracymus phalacroides* Wooldridge 1978: 129; Hansen 1999: 112.

#### Types (Fig. 24)

*Holotype* male (1.7 x 1.0 mm): **New South Wales**: Barrington, NSW, 17.8.1997 C. Watts, SAMA; aedeagus preserved in DMHF. *Paratypes*: **New South Wales**, same data (2 females) SAMA; Batemans Bay 2 km N, C. Watts 18.4.1997 (5 males 3 females) SAMA, MSNV; Blue Mountains, Faulcon Bridge 500 m, G. Wewalka 15.1.1993 (1male 2 females) NMW, MSNV; Cabbage Tree Creek, Nelligan 20 km W, C. Watts 30.11.1995 (1male) SAMA; Dorrigo, W. Heron (1 female) ANIC [*Paracymus phalacroides*? det. D. P. Wooldridge]; Failford 8 km N, C. Watts 18.8.1997 (2 males 1 female) SAMA, MSNV; Valery, A. P. M. *Eucalyptus* plantation, McMullen's Block, 30°24'S 152°57'E, light trap, R. S. McInnes 10.1.1967 (4) ANIC, MSNV; Windsor, A. M. Lea 1871, Griffith Coll. (17) SAMA, MSNV. **Northern Territory**: Jabiru 10 km SW, C. Watts 22.3.1998 (1) SAMA; Gubara 1 km W, Kakadu NP, C. Watts 17.3.1998 (1 male) SAMA. **Western Australia**: Fremantle 10 km S, C. Watts 24.10.1996 (1) SAMA.

#### Description

Length 1.6–1.9 mm; width 1.0–1.1 mm. Body convex, short oval (Figs 20, 21), entirely black, only tips of palps and legs reddish. Head shining, smooth, only occipital region alutaceous, evenly punctured, intervals between punctures large,

nearly twice as large as the punctures. In frontal view one eye measures nearly 1/6 of interocular space. Pronotum black, shining, smooth, evenly punctured as on head; at 100 x bottoms of punctures are umbilicate or jutting. Anterior margin of pronotum protruding in centre and laterally; lateral margin arched so that posteriorly pronotum enlarges. Scutellum triangular, slightly elongate, with curved sides, faintly punctured. Elytra short, their maximum width at anterior third; punctures denser than on pronotum, at 100 x umbilicate or rugose, evenly distributed; surface slightly alutaceous between punctures; parasutural furrow on apical 2/3 or a bit less. Underside black. Labrum arched, slightly hollow at centre; postlabium flat or convex, alutaceous at 100 x with scarce and faint punctures. Gula alutaceous, with two furrows and two deep punctures. Prosternum tectiform, keeled; mesosternum with longitudinal keel anteriorly expanded; metasternum punctured and pubescent, elevated in centre, slightly hollow and posteriorly produced. Five visible abdominal sternites, micropunctured, not keeled; pygidium with a dozen stiff and short setae directed posteriorly and centrally. Profemora excavated, granulose and hairy on basal 2/3; mesofemora hairy on basal 3/4; metafemora smooth, with sparse hairs. Tibiae shorter than femora, spiny at their margins; tarsi not expanded in male, claws hooked. Aedeagus (Fig. 15) nearly 1/4 as long as body; tegmen shorter than parameres, narrow and pointed at base; parameres slender, with rounded apices; penis conical, pointed, without any collar.

#### Discussion

Characters of the species distinguishing it from all Australian *Paracymus* are the umbilicate punctures, the copious hydrofugal hairs at the base of the mesofemora (only *cariceti* has more), the lack of any keel on the first ventrite (as in *cariceti*, which however has a tubercle instead of a keel), and the aedeagus (penis triangular to the apex, tegmen abruptly pointed). From *pygmaeus* it is also separated by the small size, the short and convex body (length:width 1.7 in *pygmaeus*; 1.6 in *watti*). With *opacus*, *australiae* and *weiri* it constitutes a group of short and convex *Paracymus* (Figs 20, 21). Wooldridge 1978 records two females of this species (SAMA; now 1 in ANIC) as possibly belonging to the palaeartic *P. phalacroides* (Wollaston, 1867). But the punctures of *phalacroides* are geminate, not umbilicate as in *watti*; the mesosternal keel of *phalacroides* is very low, in *watti* normally

shaped; and the bases of the parameres are internally excavated in *phalacroides*, swollen in *wattsii*.

#### Biology

One label has the note: light trap. C. Watts captured his specimens 'in thick grassy vegetation at edge of water in large swampy areas' (personal communication).

### 7. *Paracymus opacus* n. sp.

#### Types (Fig. 25)

**Holotype** male (1.7 x 1.0 mm): **Queensland**, Bentinck Is. Minakuri, Aitken & Tindale 23.5.1960 at light, SAMA. **Paratypes**: **Queensland**: Bentinck Is. Minakuri, Aitken & Tindale 23.5.1960 at light (4) SAMA, MSNV; Paluma Dam Road, J. G. Brooks 13.1.1968 (1) ANIC; Seaforth 1 km NW, 20°53'S 148°57'E, A. Gillison 18.11.1981 Berlesate, Melaleuca woodland (1) ANIC; Stewart R., W. D. Dodd (3) SAMA, MSNV; Townsville 20 km N, Bushland Beach, A. J. Watts 6–11.2.1998 (2) SAMA.

#### Description

Length 1.6–2.0 mm; width 0.95–1.2 mm. Body convex, short, oval (Figs 20, 21), entirely black. Upper body entirely alutaceous, satiny, impunctate. Head grey-black, satiny like pronotum and elytra, branches of Y-suture conspicuous. Pronotum enlarged posteriorly. Scutellum triangular, impunctate. Elytra with parasutural furrow in apical 2/3 or a bit less. Underside black or dark brown; postlabium flat, alutaceous, impunctate; prosternum short, roof-like, with a longitudinal keel; mesosternal keel short, ending anteriorly close to a high transverse ridge; metasternum hairy, elevated in middle as a flat triangle posteriorly acute. First abdominal ventrite with a median keel, rising from a central process protruding anteriorly. Antennae 8-segmented; basal 2/3 of profemur densely pubescent, protibiae and protarsi short and thick, last tarsal segment with a small denticle in males; claws short and hooked. Aedeagus (Fig. 16) with a very long tegmen, penis rod-like, anchor-shaped at tip, parameres provided with a triangular membrane, progressively expanded from base to apex.

#### Discussion

Among Australian *Paracymus*, *opacus* differs in having a strongly alutaceous and impunctate upperside, a flat hairy triangular prominence on

the metasternal surface, and a very unusual aedeagus: tegmen more than twice as long as the length of the parameres, which are expanded towards the penis by a membrane. It is very near *P. watsii* in body form and size, but is easily separated by the preceding characters.

#### Biology

Four specimens captured at light, one from forest floor litter, with Berlese funnel.

### 8. *Paracymus australiae* n.sp.

#### Types (Fig. 25)

**Holotype** male (2.3 x 1.4 mm): **Northern Territory**: Oenpelli 6 km SW by S, 12°22'S 133°01'E, E. G. Matthews 30.5.1973 at light, ANIC. **Paratypes**: **Northern Territory**: Baroalba Spring, 12°47'S 132°51'E, 20.11.1972 (1) ANIC; Borroloola 46 km SSW, 16°28'S 136°09'E, J. E. Feehan 23.4.1976 (6) ANIC, SAMA, MSNV; Borroloola 48 km SW by S, McArthur R., 16°27'S 136°05'E, J. E. Feehan 13.4.1976 at light (1) ANIC; Cahills Crossing 1 km S, E Alligator R., 12°26'S 132°58'E, E. B. Britton 3.11.1972 at light (1) ANIC; Cape Crawford 8 km ESE, Bessie Spring, 16°40'S 135°51'E, M. S. Upton 26.10.1975 (1) ANIC; Mt Cahill 8 km E, Nourlangie Ck, 12°52'S 132°47'E, E. B. Britton 27.10.1972 at light (1) ANIC; Mt Cahill 15 km E by N, 12°50'S 132°51'E, E. B. Britton 29.10.1972 at light (4) ANIC, SAMA, MSNV; Mt Cahill 15 km E Koongarra, 12°52'S 132°50'E, M. S. Upton 15.11.1972 (5), 6–10.3.1973 (3) ANIC, SAMA, MNSV; Mudginbarry HS 9 km N by E, 12°31'S 132°54'E, Upton & Feehan 10.6.1973 (3) ANIC, SAMA, MSNV; Oenpelli 6 km SW by S, 12°22'S 133°01'E, Upton & Feehan 6.6.1973 (1) ANIC.

#### Description

Length 2.0–2.5 mm; width 1.35–1.5 mm; short, oval, slightly convex. Upper side black with dark testaceous contour zone; head, pronotum and elytra coarsely punctate, space between punctures nearly as large as punctures; each puncture larger than those of *P. pygmaeus*. Head entirely black, anteriorly slightly hollow in centre to receive labium; sutures not conspicuous; eyes large, together nearly 6/10 width of interocular space. Pronotum anteriorly slightly curved, with notably prominent corners, much larger at base (ratio hind width : fore width 1.65); black with brown sides, evenly punctured as on elytra. Elytra, observed from above, nearly as long as wide (ratio elytral



FIGURE 25. Distribution of the studied specimens of *Paracymus opacus* n. sp. (▲), *australiae* n. sp. (■), *weiri* n. sp. (●), and *ovum* n. sp. (◆).

length : elytral width 1.07); parasutural furrow in apical 3/4 or a bit less; black with brown sides and apex. Underside dark, brown to reddish; labrum of male with two small specula, postlabium flat, slight and shining; prosternum roof-like, with longitudinal keel; a fine mesosternal keel anteriorly reaches a robust crescent-shaped ridge; metasternum hairy, two reliefs provided with tufts of setae delimiting a central glabrous area; first abdominal ventrite keeled on anterior 1/2–1/3. Palps yellow, antennae 8-segmented; profemora hairy on basal 3/4, male protarsi with a robust seta or tooth; mesofemora with hydrofuge hairs on a large postero-basal area; metafemora glabrous. Aedeagus (Fig. 10) long, nearly 3/10 of body length, tegmen constricted near base, bluntly pointed, longer than parameres, these blunt at apices, penis nearly triangular, gradually narrower from base to apex, without any collar.

#### Discussion

Among the Australian *Paracymus*, some features are exclusive to *australiae*: the great

length of the parasutural furrow, the coarse dorsal punctation with large punctures, the male specula, the two hairy metasternal reliefs, and the first ventrite, which is keeled only anteriorly. This species is distinguishable from *pygmaeus* also by the stocky body shape, and by the aedeagus being more slender, straightened basally, with penis gradually narrowing, not suddenly restricted in the apical zone, unprovided with a collar.

#### Biology

Some specimens were captured at light, others in standing or flowing water.

#### 9. *Paracymus weiri* n. sp.

##### Types (Fig. 25)

**Holotype** male (2.9 x 1.7 mm): **Western Australia**: Carson Escarpment, 14°49'S 126°49'E, Common & Upton 9–15.8.1975 ANIC. **Paratypes**: **Western Australia**: Carson Escarpment, 14°49'S

126°49'E, Common & Upton 9–15.8.1975 (9)  
ANIC, SAMA, MSNV.

#### Description

Length 2.3–3.0 mm, width 1.5–1.8 mm; short oval, convex. Head black, evenly punctured, interspaces smooth, nearly as large as punctures; anteriorly a central hollow receives labrum; eyes slightly protuberant, their width together nearly 2/3 of interocular space; Y-suture reduced to an incomplete periocular groove. Pronotum and elytra black with lateral margins and apex testaceous-reddish, punctured as on head or more deeply; elytra with parasutural furrow in apical 2/3 or a bit less; scutellum triangular, slightly elongate, punctured. Underside dark. Postlabium flat and smooth; prosternum evidently keeled; mesosternum with a longitudinal keel ending anteriorly as an arrow-head; metasternum glabrous in centre, the glabrous area delimited by two hairy lines converging posteriorly. First abdominal ventrite with a high keel almost reaching posterior margin. Palps and antennae (8-segmented) yellow with dark tips; legs dark; profemur pubescent nearly to the knees, last segment of male protarsi with two little teeth; mesofemora pubescent for nearly 2/3 of posterior margin. Aedeagus as in Figs 13, 14: tegmen concave at base, longer than parameres; these blunt at apices; penis conical, stout, provided with a preapical expansion or collar.

#### Discussion

Considering the body shape, *P. weiri* belongs to the group containing *wattsi*, *opacus*, and *australiae* (Figs 20, 21); the outline of the aedeagus recalls *P. ovum*. The body shape and upper punctuation are similar to *P. australiae*, but *weiri* is larger in size and not provided with male specula; it has the first abdominal ventrite with a high keel and a very different aedeagus: base of tegmen concave (in *australiae* bluntly pointed), penis abruptly expanded before the apex (in *australiae* uniformly conical).

#### A KEY TO THE AUSTRALIAN *PARACYMUS*

1. — Elytral colour mahogany or testaceous brown; pronotum black. Aedeagus as in Figs 6–8: tegmen pointed at base, penis with a simple preapical collar, external border of parameres evenly curved. Elongate oval (Figs 18, 19). Length 1.5–2.3 mm .....  
..... *spenceri* Blackburn
2. — Pronotum and elytra black. Aedeagus with different combination of characters: base of tegmen concave, or penis without a simple preapical collar, or parameres externally straight ..... 2
2. — Male protarsus swollen, last segment evidently thicker than in female, proclaws spatulate, inner one stronger than outer. Aedeagus as in Figs 1–5: base of tegmen pointed, penis with a preapical collar originating a basal membrane, parameres externally straight. Elongate oval (Figs 18, 19). Length 1.6–3.0 mm .....  
..... *pygmaeus* (McLeay)
- Male protarsus not or only a bit swollen. Aedeagus without a preapical collar originating a membrane ..... 3
3. — Upper side impunctate and strongly alutaceous, satiny. Aedeagus as in Fig. 16: a very long tegmen (more than 2 x the length of parameres), penis rod-like, anchor shaped at apex, parameres internally originating as a membrane. Short oval, convex (Figs 20, 21). Length 1.6–2.0 mm .....  
..... *opacus* n. sp.
- Upper side punctured, smooth or moderately alutaceous. Tegmen shorter, parameres without any membrane ..... 4
4. — Dorsal punctures (magnification 100 x) umbilicate or with a jut in the bottom. First abdominal ventrite not keeled nor tuberculate. Short, widely oval, convex (Figs 20, 21). Aedeagus as in Fig. 15: tegmen sharply pointed, penis conical, without any collar. Length 1.6–1.9 mm.  
..... *wattsi* n. sp.
- Dorsal punctures simple, not umbilicate. First abdominal ventrite keeled or tuberculate. Tegmen never sharply pointed ..... 5
5. — Antennae 9-segmented. Maxillary palps long, 0.6 x width of head. Dorsal surface slightly shagreened. Metasternum with a conspicuous triangular dimple. Aedeagus as in Figs 11, 12: tegmen provided with a central jut covering the base of the penis. Length 3.0 mm ..... *gigas* Gentili
- Antennae 8-segmented. Maxillary palps shorter than 0.5 x the width of head. Metasternum without any dimple. Tegmen simple, without any jut anteriorly protruding ..... 6



6. — Parasutural furrow covering nearly 3/4 of elytral length. Upper side coarsely punctured with large punctures. Male labrum with small specula. Only anterior 1/2–1/3 of the first ventrite keeled. Aedeagus as in Fig. 10: base of tegmen bluntly pointed, penis simply conical. Length 2.0–2.5 mm ..... *australiae* n. sp.
- Parasutural furrow covering nearly 2/3 of elytral length. Labrum without specula. First ventrite not or differently keeled. Apex of penis anchor-shaped ..... 7
7. — Whole ventral surface of mesofemora pubescent. First ventrite tuberculate along the median line. Aedeagus bluntly pointed at base, penis with apical anchor, apices of parameres acute (Fig. 9). Length 1.7–1.8 mm ..... *cariceti* n. sp.
- At least apical 1/3 of mesofemora glabrous. First ventrite keeled. Aedeagus concave at base, penis with preapical expansion, apices of parameres blunt ..... 8
8. — First ventrite completely carinate with a flat longitudinal keel. Dorsal punctures more feeble. Elongate oval (Figs 18, 19). Aedeagus as in Fig. 17: tegmen nearly as long as parameres, penis more thin, rod-like, with feeble preapical expansions. Length 2.5–2.8 mm ..... *ovum* n. sp.
- First ventrite with a high keel not covering whole segment. Dorsal punctures stronger. Short oval (Figs 20, 21). Aedeagus as in Figs 13, 14: tegmen longer than parameres, penis more stout, subconical, with strong preapical expansions. Length 2.3–3.0 mm ..... *weiri* n. sp.

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